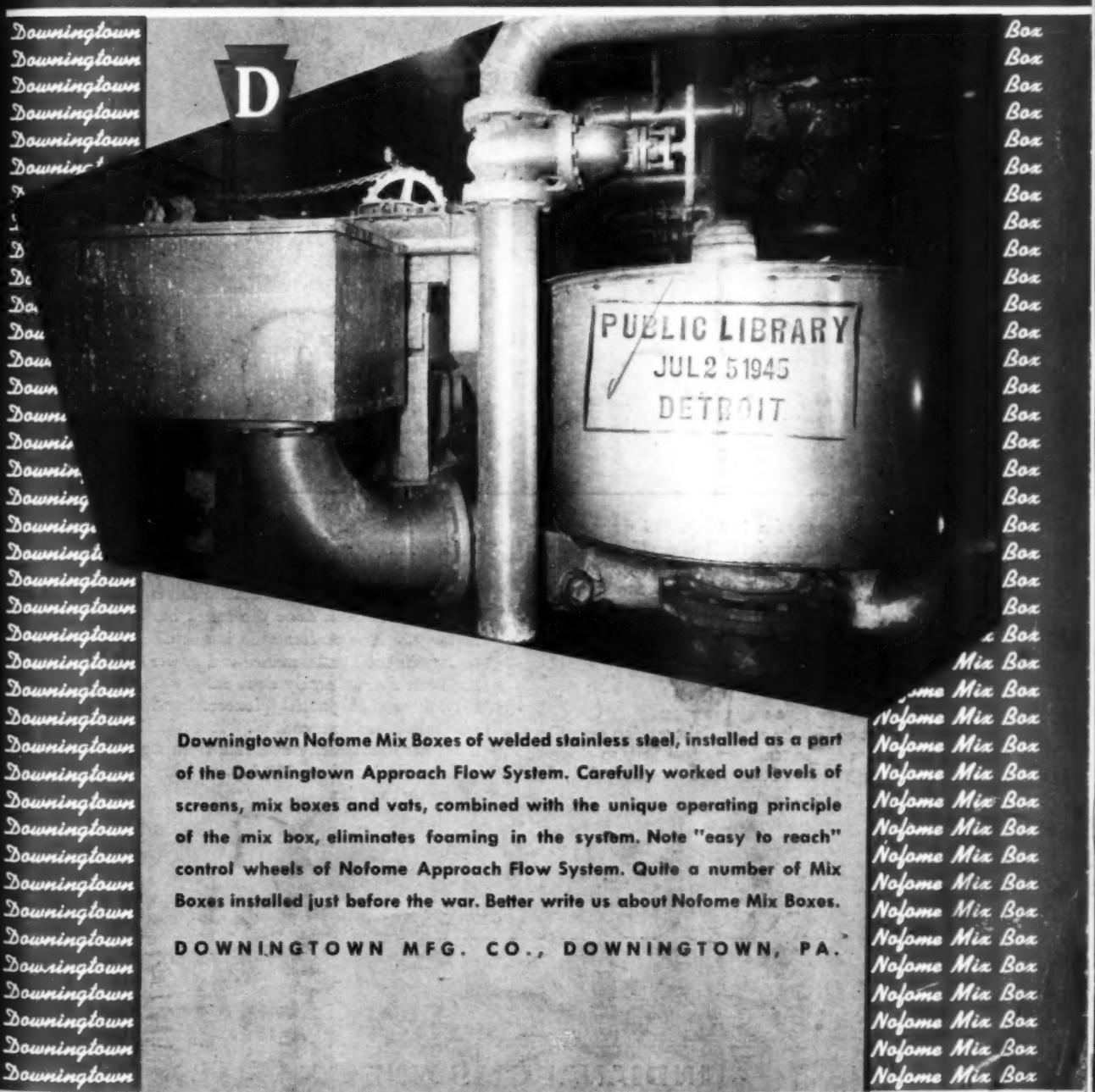
THE PAPER INDUSTRY and PAPER WORLD

AN EDUCATIONAL NEWS MAGAZINE—JULY, 1945

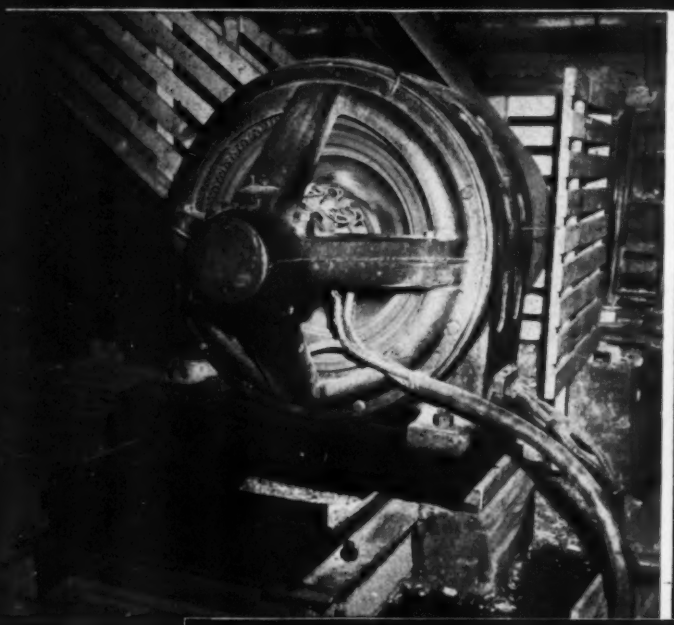


Downingtown Nofome Mix Boxes of welded stainless steel, installed as a part of the Downingtown Approach Flow System. Carefully worked out levels of screens, mix boxes and vats, combined with the unique operating principle of the mix box, eliminates foaming in the system. Note "easy to reach" control wheels of Nofome Approach Flow System. Quite a number of Mix Boxes installed just before the war. Better write us about Nofome Mix Boxes.

DOWNINGTOWN MFG. CO., DOWNINGTOWN, PA.

BECAUSE BELT TENSION *must be* CONTROLLED

as every paper mill engineer knows



ROCKWOOD *automatic belt tightening* MOTOR BASES

Above are two views of a 100 h.p. 435 r.p.m. motor driving a 2,400 lb. beater in the mill of the Crystal Tissue Company, Middletown, Ohio.

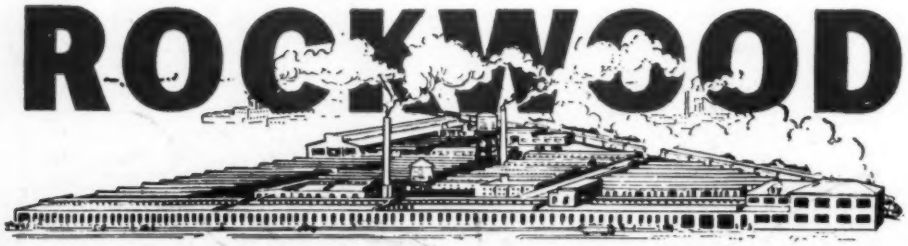
Paper mill engineers were among the first to appreciate that belts must be made to run at the right tension. If the belts are too loose they slip, driven machine speeds drop, machine capacity falls off—while the belt slip wears out the belts unduly. If too much tension is in the belts both the bearings and belts take too much punishment and either wear out or give way too soon.

To operate flat or V-belts at the right tension regardless of load changes or of the tendency of all belts to elongate under load peaks requires Rockwood automatic belt tension control motor bases.

Hundreds of paper mills have installed Rockwood automatic belt tightening motor bases under the motors driving beaters, vacuum pumps, belt driven Jordan engines, compressors, fans, paper machine drives, etc., etc. Wherever this has been done the result has been more satisfactory machine performance, increased machine capacity, savings in both maintenance and power and the belt life has been approximately doubled.

Rockwood originated, pioneered and developed, automatic belt tension control. Rockwood pivoted motor bases are immediately available from stock up to 60 h.p. —from semi stock to 250 h.p. and larger sizes are made promptly to order.

ROCKWOOD



INDIANAPOLIS, INDIANA

THE LONGEST WE'D EVER POURED . . .
Looks like a simple job, but the rough casting for this mock gun barrel was 334 inches long—and had to be poured *vertically*. We couldn't use a conventional core, either; had to make a pipe core. Altogether, it was a big and exciting job . . . so out of the ordinary, in fact, that nobody else seemed to want to tackle it. Beloit craftsmen, we're proud to say, knew how the job should be done, and took it right in their stride.
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A PAPER MILL IS PART OF EVERY BATTLE
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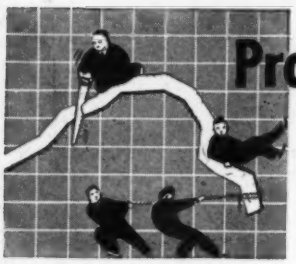
WHEN YOU BUY BELOIT . . . YOU BUY MORE THAN A MACHINE!



Production costs ~~must~~ *can* come down...

IN YOUR PLANT Honan-Crane Oil Purification Equipment can greatly reduce operating costs by eliminating excessive wear, cutting maintenance costs and increasing productive time. It also can save substantial amounts of money by safely extending the life of lubricating oils.

Unless you are using Honan-Crane Equipment to maintain clean oil for paper machines, Diesels, turbines, compressors, etc., you are probably not getting half of the results possible to obtain through effective oil purification.

HONAN-CRANE EQUIPMENT PAYS DIVIDENDS—case history shows outstanding results...

THE PROBLEM Illustration below shows dryer rolls of paper machine operated by large Southern Paper Mill. The 2,000 gallon circulating system of the dryer-roll bearings was equipped with strainer type filter to keep this oil clean.

This strainer type filter did not remove the fine sediment in the oil and gave no control over the neutralization number of the oil.

Corrosion developed in the anti-friction bearings and bearings had to be replaced at frequent intervals. (These bearings were 9 inch SKF double roll bearings and cost approximately $300.00 each.)

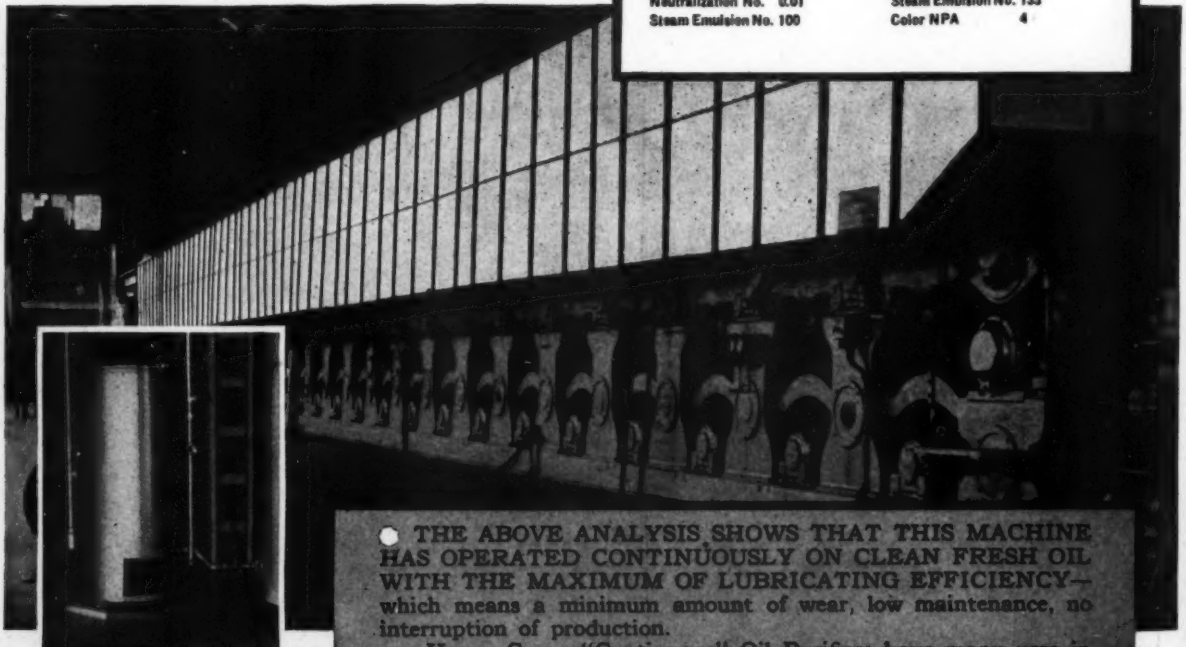
It was necessary to drain all oil at the end of each year and replace with new oil at a cost of $1,300.00.

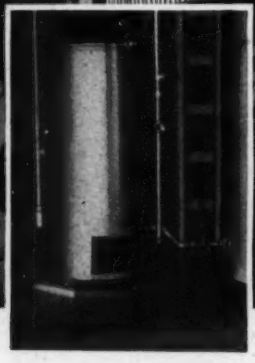
To correct this condition a Honan-Crane Purifier (model 2036) was installed on this machine in January, 1944.

THE RESULTS Within four months after installation of the Honan-Crane Purifier all corrosion trouble was eliminated. No more bearing replacements due to contaminated lubricating oil.

At the end of fourteen months the oil was as good as new. No need to change this oil (saving $1,300.00 per year).

Specifications of Analysis of Purified Oil — fourteen months operation . .		Analysis of oil at end of fourteen months operation with Honan-Crane Purifier	
Gravity API	28	Gravity API	28.0
ASTM Pour	5	Viscosity @ 100 F.	623 seconds
Open Cup Flash	480° F	Viscosity @ 210 F	67½ seconds
Open Cup Fire	545° F	Viscosity Index	87.5
Viscosity @ 100	610	Flash Point	485 F.
Viscosity @ 210	67	Fire Point	550 F.
Viscosity Index	88	Pour Point	0 F.
Color NPA	2.5	Carbon Residue	0.08%
Carbon Residue	0.07	Neutralization No.	0.00
Neutralization No.	0.01	Steam Emulsion No.	133
Steam Emulsion No.	100	Color NPA	4





Inset in picture shows Honan-Crane installation. Note streamlined compactness. Purifier with enclosed pump and motor can be located where desirable.

● THE ABOVE ANALYSIS SHOWS THAT THIS MACHINE HAS OPERATED CONTINUOUSLY ON CLEAN FRESH OIL WITH THE MAXIMUM OF LUBRICATING EFFICIENCY—which means a minimum amount of wear, low maintenance, no interruption of production.

Honan-Crane "Continuous" Oil Purifiers have many uses in Paper Mills. They can be used on Diesel lube and fuel oils, Turbine and Hydro-Electric Generators, Paper Machines, Compressors, Hydraulic Equipment, etc. For complete information write . . .

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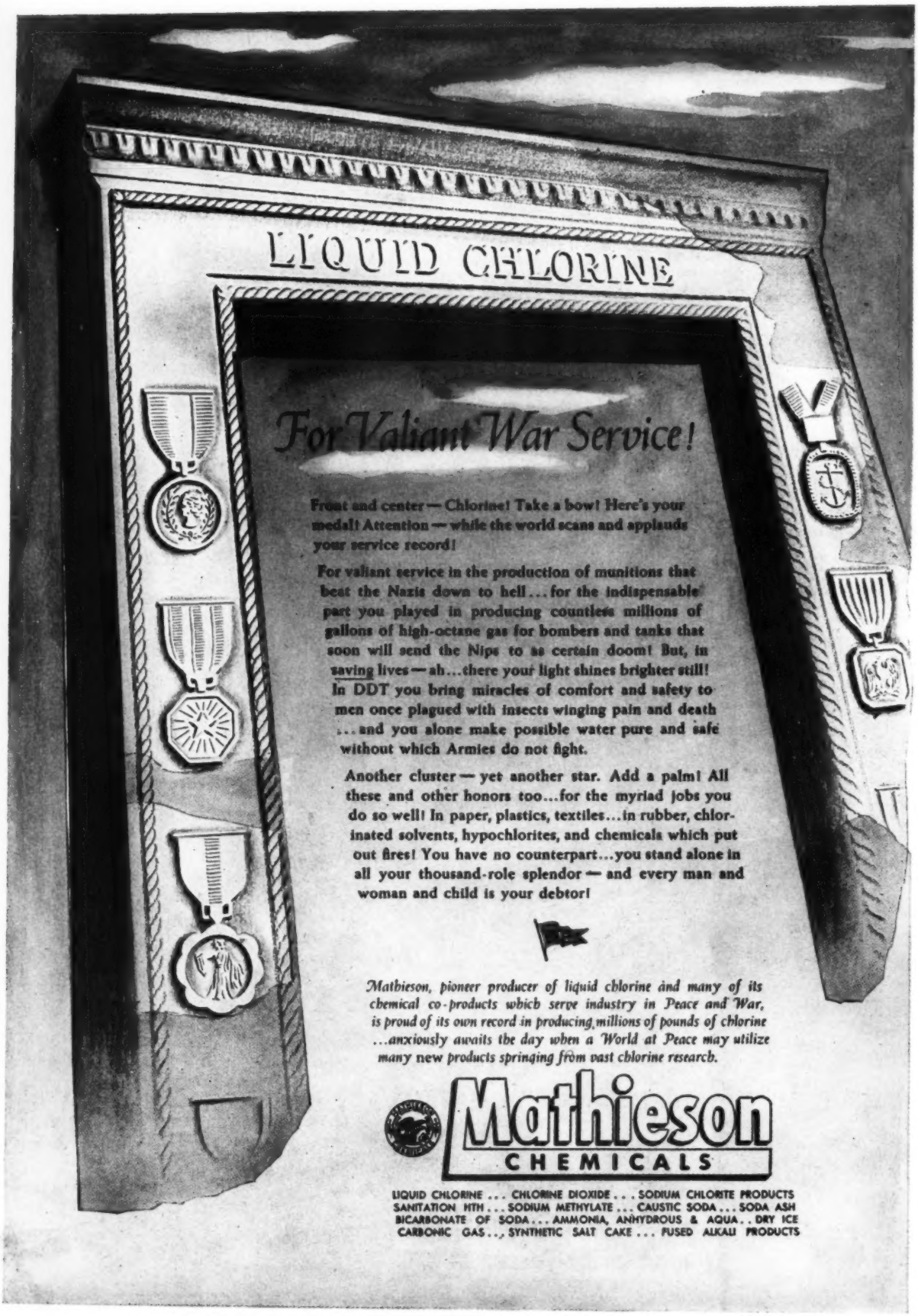
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Front and center — Chlorine! Take a bow! Here's your medal! Attention — while the world scans and applauds your service record!
For valiant service in the production of munitions that beat the Nazis down to hell... for the indispensable part you played in producing countless millions of gallons of high-octane gas for bombers and tanks that soon will send the Nips to as certain doom! But, in saving lives — ah...there your light shines brighter still! In DDT you bring miracles of comfort and safety to men once plagued with insects winging pain and death ...and you alone make possible water pure and safe without which Armies do not fight.
Another cluster — yet another star. Add a palm! All these and other honors too...for the myriad jobs you do so well! In paper, plastics, textiles...in rubber, chlorinated solvents, hypochlorites, and chemicals which put out fires! You have no counterpart...you stand alone in all your thousand-role splendor — and every man and woman and child is your debtor!
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(Reg. U. S. Pat. Off.)

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—FEATURES—

Materials Handled in the Pulp and Paper Industry ..... Harry E. Weston 533
Sulphite Turpentine . . . a Review of the Literature ..... T. T. Collins, Jr. 537
Papermakers Should Capitalize Services of the Sales Engineer ..... Bernard Lester 541
Fine Papers from Domestic Flax . . . The Story of Ecusta ..... S. R. Brookshire 543
Accidents and Light ..... J. L. Kilpatrick 546
German Research on the Use of Sodium Chlorite in the Manufacture of Wood Pulp and Cellulose ..... G. P. Vincent 547
The Reciprocal Trade Agreement and You 549
"Task Force" Meeting Replaces Superintendents Annual Convention 552
Canadian Technical Section Holds Summer Meeting 556
Review and Preview of the Paper Industry ..... D. Clark Everest 584
Convention Papers . . . Abridged 592

—NEWS—

A Glance into the Future 488
Trade Winds 489
Associations 552
Allied 562
Safety 568
Names in the News 570
Personals 570
Necrology 578

—DEPARTMENTS—

Editorials 513
Current Thought 514
Paper Sketches 550
Coming Events .....
Safety Contest Scores 568
Practical Shorts 581
New Equipment and Supplies 624
Technical Developments 628
Papermaking Patents 632
New Publications 636
Current Market Quotations 640
Index to Advertisers 643

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IF YOU CAN'T REPLACE • • • RENEW!

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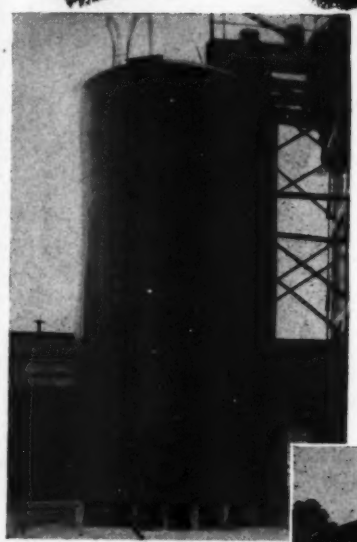
NOT ONLY DESIGNED BUT BUILT TO MEET SPECIFIC PAPER MILL REQUIREMENTS



THE flat-bottom storage tanks shown here are typical of the water and chemical storage tanks which we design and build for the paper industry. These units, from blueprint to final installation, were built to meet specific paper mill requirements. They are of modern, welded steel construction.

In addition to flat-bottom storage tanks, we build elevated water tanks, welded steel pipe, diffusers, bins, digesters, cookers and standpipes. A modernization program incorporating this type of steel plate work can place your mill in a better position to meet competition and attain greater production capacity.

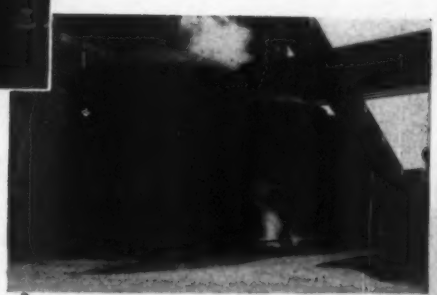
Address our nearest office for quotations, stating capacity desired, location and product to be stored.

Above: A 40,000-gal. hot water tank which we designed, fabricated and erected at a paper mill in Florida.

Left: A 40-ft. diam. by 20-ft. high water storage tank providing suction for a fire pump at a paper mill in Arkansas.

PLAN NOW FOR YOUR EXPANSION PROGRAM WITH MODERN, WELDED STEEL STORAGE TANKS *DESIGNED* AND *BUILT* FOR THE JOB.

Right: Three 28-ft. diam. by 25-ft. black liquor tanks which we designed and built for a paper mill in the South.



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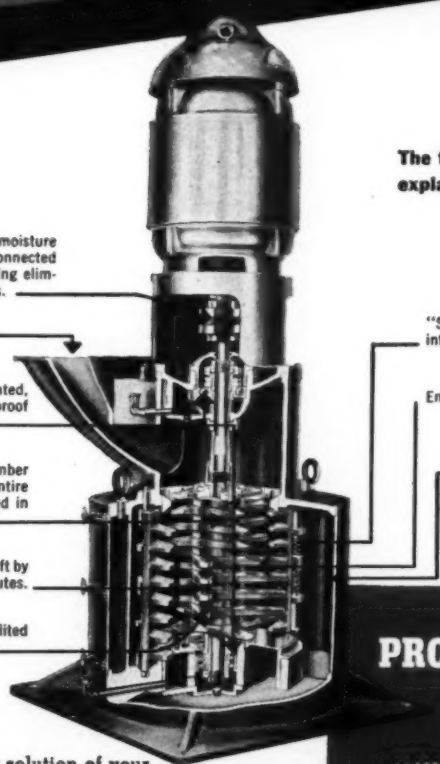

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The features of Enterprise Vertical Mills illustrated explain why Enterprise offers you these 8 benefits

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Material in disintegration chamber surrounds rotor so that the entire revolution of the rotor is engaged in useful work.

Hammers locked on solid steel shaft by locking rings are changed in minutes.

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"Swing-away" comb rack prevents damage to mill if metal is accidentally fed into disintegrating chamber.

Entire screen area discharges finished material.

Simple construction with parts machined to fit. No crevices for materials to lodge.

For a simple low-cost solution of your problems of grinding, mixing, macerating, shredding or pulping, there is an Enterprise Vertical Mill to meet your needs. Write today for full information on models and applications. Address Dept. J-13.

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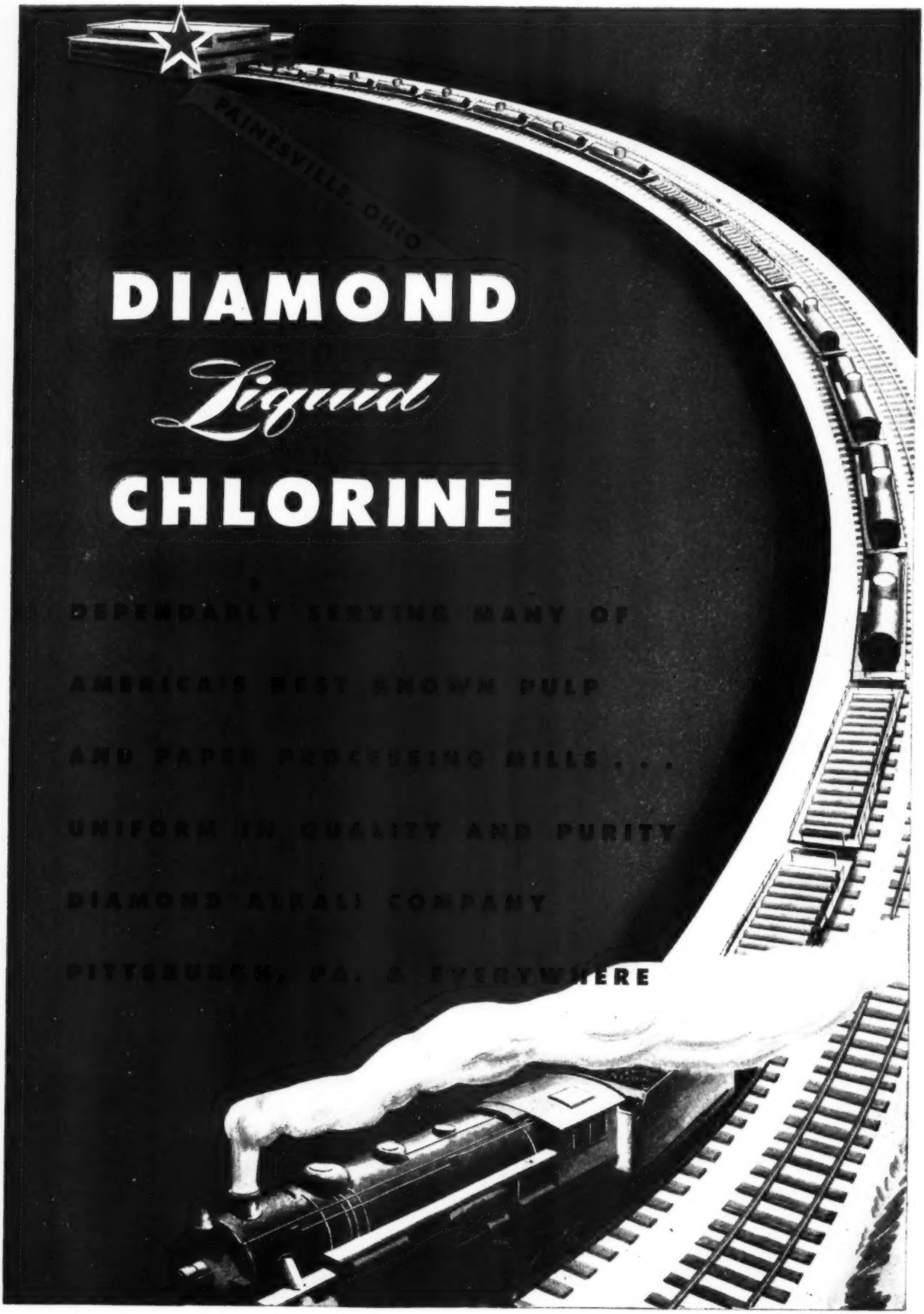
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Especially Developed
For Making High Freeness
Insulating Board Pulp

This new Norton Pulpstone combines the features of OPEN STRUCTURE (large pore space) with the advantages of 38 ALUNDUM abrasive. The result is a stone for board pulp mills that is cooler running and that produces pulp of a higher strength to freeness ratio than that obtained by any previous type of stone.

Improved, too, is the internal construction of this stone. Its new design was developed especially to meet the requirements of today's mills with their high power input, high temperature grinders.

Let us tell you more about this new Norton Pulpstone for operation in insulating board mills.

NORTON COMPANY, Worcester 6, Mass.

Glance into the Future . . .

We* Predict . . .

The demand for paper will be greater than ever before.

Because literally hundreds, perhaps thousands, of new uses for paper have been discovered as the result of war conditions and demands.

Because the present paper inventory, board, container, bonds, etc. is very low—literally hand to mouth.

Because there has been no increase in mill capacity to meet these conditions and the conditions will largely remain after the war.

We also predict that many mills will undertake extensive equipment expansion or replacement programs to bring their efficiency up to par.

Because new papers have been developed that are today being produced on equipment not too well adapted to the purpose, which equipment will have to be replaced by specially designed equipment.

Because mills are, due to inability to do more than make emergency repairs for several years, operating under "forced draft" to meet demands.

Because in the long run, only the more efficient mills can prosper. They will, in turn, force other mills to do likewise or suffer through their failure to improve their facilities.

NOSTRADAMUS

Michel de Nostradamus, sixteenth century physician, who predicted with uncanny accuracy many major events of the succeeding years, including outstanding personalities, the big wars and many of the great discoveries and inventions. Today his name is actually synonymous with "prophecy."

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TRADE WINDS

Paper Trade in Europe

EDITOR'S NOTE: Before the war, news from "Other Countries" was submitted by regular contributors to this magazine. The following letter has just been received from one of those contributors.

▶▶▶ As, at the time of writing these notes, the cessation of hostilities in Europe is only three weeks old it is to be expected that news of the Paper Trade from the Continent is scanty.

However, the veil is being lifted and scraps of news are filtering through. The over-all picture is one of stagnation rather than devastation.

The general impression from Sweden is of a production during the war years of a little over 50 per cent of prewar. Exports from Sweden have been considerably reduced since 1940 and little has left that country for areas outside Europe, except to the Argentine. Sweden has been thrown back on production for home consumption plus a new group of paper substitutes. Supplies to "Fortress Europe" as the war moved into the Continent, particularly after the landing on Normandy, have obviously become precarious.

Sweden is, however, now awaiting for shipping to be available in order to export again to her principal market, Great Britain. Already the British Paper Controller is reported to have placed appreciable orders for pure and mechanical pulp to be delivered during the first year of peace in Europe and later reports state that additional orders have been placed or are being negotiated. Orders for finished paper are also being placed.

From Belgium we have news that practically all paper mills are intact, the only casualty being the Malmedy mills of Messrs. Steinbach which was damaged during the last offensive by the Germans round about last Christmas. The mills have been free from pilfering by the Germans who, contrary to the experience in World War I, do not appear to have seriously interfered either with paper or machinery. Prior to the present war the Belgian papermakers accumulated fair stocks of materials and by the economical use of these along with small fresh supplies were able to spread them over the war years.

It would appear that the position is similar in France and Holland while in Norway, the last to be liberated, a general study of the position is under way and a report is awaited. Finland seems at the moment to be left out in the cold for apart from news, many months ago, that several fine mills in the military zone had been badly damaged, no news is appearing.

While there is the machinery in these countries ready to make paper, the means of effecting this are practically absent. The whole subject of reviving the Paper Trade in Europe is governed by the urgent need of materials, labor, coal and transport. It can be appreciated that the Allied Governments have a tremendous problem on their hands in the repatriation of prisoners of war and the millions of displaced persons not to mention the awful and constant nightmare of keeping these nations above the starvation line. The revival of the continental Paper Trade must obviously be an extremely slow business during the first few months. There are so many important things which must have priority and concurrent with the effort to get trade moving again is the political unrest which is showing itself in every country.

Great Britain, which has happily been free from the invader, has nevertheless suffered a great deal of destruction, is faced with a similar set of problems. Fortunately here again the damage to paper mills has been suprisingly light particularly when it is remembered that so many mills are situated around the River Thames and its tributaries and all these were in the path of London from the continent. Among the most remarkable instances must be that of the Thames Board Mill. This large mill which houses one of the largest, if not the largest, board machines in the world, is situated at Purfleet, and one glance at the map is sufficient proof of its vulnerability, yet it has been working at full pressure throughout the war subject to the restrictions on materials and labor.

A mill in the north of England received a direct hit and was completely destroyed while another, in London, suffered a similar fate from a flying bomb. Dover was another healthy spot and a few others have been damaged but for the most part superficially. Incidentally a very much higher rate of casualty has unfortunately been suffered by the printing trade.

Serious shortages of labor and materials are the predominanting features of the Paper Trade in Britain at the moment but happly the Trade can now look forward to a steady improvement. It is, however, not expected that in the circumstances this improvement can be rapid. There is still another war to be settled, and until this is cleared up full expansion cannot take place. But as already mentioned or-

ders have been placed for a fair amount of materials in Sweden and when the shipping is available this should ease the situation.

How long it will take Great Britain to satisfy home needs it is impossible to state. A fair estimate is at least three years providing there are no setbacks. The publishing trade alone has millions of books to replace, for apart from losing several million in one night of blitz, stocks are practically exhausted and replacement over the past nearly six years has been impossible. Newspapers in this country—the national dailies have circulations ranging from one to three and a half millions—have been reduced all through the war to four pages from a prewar standard of 16/24 pages. Stationery for personal use is almost unobtainable (in some districts the news that the local stationer has a supply of envelopes immediately produces a queue) and the really good quality stationery is non-existent. Practically no shopping is packed except wet foods and small items such as tea, sugar and cereals. All the beautiful packs for cosmetics, chocolates, etc., have disappeared. Music publishers have been starved for years; popular sheet music is published in a size slightly larger than demy 8vo, and the diary and Christmas card publishers have been in a similar unhappy position.

◆

SWEDEN'S CELLULOSE EXPORTS TO THE U. S.*

The mine-infested waters of Skagerrak are being cleared by the Swedish Navy, and when that work has been finished it will again be possible for the United States to import cellulose from Sweden. About 1,200,000 tons can be shipped by Sweden to the United States during the first twelve months. This amount might even be increased somewhat, if the European and South American consumers should be unable to take all that has been reserved for them. American paper mills are said to have made reservations for about 900,000 tons. Last year the British signed contracts for delivery of 275,000 tons of cellulose and 100,000 tons of mechanical pulp, and further British purchases are expected.

Sweden has about 700,000 tons of cellulose in stock, and its production capacity amounts to approximately 225,000 tons monthly, not including production for domestic use. There is thus good reason to believe that Sweden will be able to meet all export requirements, even if its cellulose industry should not be able to attain full capacity immediately. In peacetime large reserves would be regarded with anxiety, but well-informed quarters point out that in the present situation, with most countries suffering from paper shortage, they will aid the sound development of the market and benefit all parties concerned.

In 1939, cellulose accounted for 18.3 per cent of the value of Swedish exports, iron ore holding second place with 12.3 and lumber third with 7 per cent. The total quantity of cellulose exported by Sweden in that year was 2,025,000 tons, of which 1,217,000 tons were sulphite pulp and 808,000 tons sulphate. No less than 833,000 tons of cellulose, almost equally divided on sulphite and sulphate, were shipped to the United States. Next in importance as a consumer of Swedish cellulose came Great Britain, which bought 440,000 tons. The United Kingdom, however, also purchased large quantities of Swedish mechanical pulp, taking 441,000 tons, while Sweden's total exports of such pulp were 508,000 tons.

The Swedish cellulose industry has expanded about as far as the supplies of domestic raw materials permit, and the progress made during the war has been chiefly in quality.

In 1943 and 1944 the Swedish pulp mills used only about one-third of their capacity. According to the Production Index of the Federation of Swedish Industries, the average monthly production of the pulp and paper industry has developed as follows (1935—100):

	1945	1944	1943	1939
January	57	40	58	94
February	—	41	55	95
March	—	45	52	100
April	—	49	51	103
May	—	49	51	102
June	—	47	50	103
July	—	43	49	105
August	—	41	46	108
September	—	43	46	107
October	—	51	47	110
November	—	56	49	112
December	—	58	47	118

◆

FRANCE IN NEED OF PULP

Emile Gaillet, director-general of the Association of Pulp and Paper Importers in Paris, has been in Montreal to meet Canadian pulp producers. Frank is looking to Canada and the United States to supply her as soon as possible with up to 50,000 tons of pulp through the Combined Board in Washington, and Mr. Gaillet is hoping that Canada will be able to supply 70 per cent of the total allocation sought from the Combined Board. He pointed out in the course of an interview that the very few paper mills in operation in France were closed three weeks out of four for lack of pulp. No pulp had been received from outside the country since the liberation except for a few thousand tons from Switzerland; but France hoped to obtain in three or four months some pulp from Sweden, Norway, and Finland as soon as shipping was available.

At present, only 10,000 to 15,000 tons of paper are being produced monthly, which represents only 10 per cent of France's minimum need. Behind the shortage of paper, said Mr. Gaillet, is the dire shortage of wood in France, which is needed for rebuilding bombed houses, for fuel, for destroyed railway ties, and for pit props, etc.

◆

▶▶▶ THE SCANDINAVIAN PULP situation has been cleared up and shipments are expected within a few weeks. Ships already loaded in Sweden are expected to sail in time to make deliveries in July. The OPA refused to authorize a higher price ceiling for Swedish pulp than for American and Canadian grades, but a reduction in ocean freight rates has achieved about the same purpose. Sweden is reported to have about 1,000,000 tons available for shipment, and the quantity to be shipped is dependent only on available shipping.

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USE OF BAGASSE IN PAPER MANUFACTURE IN PERU*

Bagasse pulp was introduced in paper production in Peru during 1939. The consumption of bagasse increased from 700 metric tons in 1940 to more than 4,000 tons in both 1943 and 1944.

Of the three mills in Peru, however, only the largest has been using bagasse pulp in the manufacture of paper. The principal product of the mill is wrapping paper, although a number of other types of paper have been made during the past 5 years.

Since the bagasse cannot be used alone, considerable quantities of wood pulp are imported to be mixed with it. The first importation of wood pulp for the manufacture of paper on a commercial scale was made in 1937 when a shipment of 830 tons was received from Sweden and Finland. In recent years, most of the wood pulp has been imported from the United States and Canada, 1943 imports amounting to 5,517 metric tons. No statistics are available to indicate how much of this quantity was used by each of the three mills.

(*) The above material is from the "Business News Letter from Sweden," released by The American-Swedish News Exchange, Inc., New York City.

*From *Foreign Commerce Weekly*, June 23, 1945.

PAPER · · · America's 6th Industry

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(NEWS ITEM: *Printing Plates made of paper are conserving scarce metal plate materials.*)

Flexible Printing Plates made of a specially-prepared, resin-impregnated paper base are replacing heavy metal plates. The printing surface consists of a coating of polyvinyl alcohol resin. While at the present time these paper plates are used entirely by Army and Government agencies, some plates soon will be available for commercial use.

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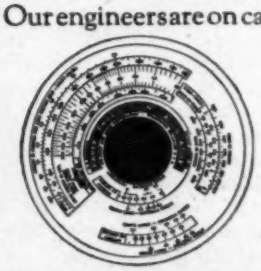

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THE SIGN OF SUPERIOR QUALITY

PASSAGE OF RECIPROCAL TRADE AGREEMENT ACT CARRIES FULL AUTHORITY

Congressional developments highlighted the month at Washington. The bitterly contested bill to extend the Reciprocal Trade Agreement Act with authority to the Administration to reduce duty rates 50 per cent from those in effect January 1, 1945, was passed with many Republicans from paper-making states voting with the Administration. The paper industry opposed the bill, pointing out the effect of reciprocity on the paper industry as evidenced by past loss of tonnage to foreign competitors, but among the Republicans supporting the Administration proposal were all four senators from New Hampshire and Vermont, one from Massachusetts, and one from Michigan. Senator Walsh, of Massachusetts (D), supported the position taken by the paper industry and other major industries which fear loss of business to low wage foreign countries.

The bill to extend OPA for another year was passed with none of the changes sought by the paper industry, but with some changes to change the method of control of food prices. The paper industry protested against the OPA policy of using the profit motive as a basis for fixing prices, pointing out the injustice resulting from refusing to authorize a price on a non-profit grade because a company might be making profit on other grades.

WPB ISSUES REPORT ON V-BOX REQUIREMENTS

The War Production Board has reported that V-box requirements of the military are programmed at 300,000 tons for the third quarter. This information was given to members of the Containerboard and the Fiber Box Industry Advisory Committee at a recent joint meeting.

June allocations have been set at almost 80,000 tons solid fiber and over 12,000 tons corrugated board, WPB said. Total board allocation to the V-box manufacturers during the second quarter amounted to almost 335,000 tons, the war agency added.

Over-all military cutbacks now taking place will release more boxes to essential civilian products later this year, committeemen were told.

Amendments to containerboard Order M-290, of varying degrees of importance, were considered at the meeting. The principal change proposed is the issuance by WPB of incentive authorizations to all corrugated and solid fiber container manufacturers, allowing them to receive additional tonnage of containerboard and thus increase production.

Transportation problems are increasing, due to boxcar shortages, with quantities of pulpwood remaining in the woods instead of being transported to the mills, industry spokesmen pointed out. Pulp and board production will suffer, they said, particularly on the east coast, unless coastwise shipments can soon be re-established, thus releasing more freight cars.

Wastepaper collection campaigns are still vital to the industry, and must be continued during the coming months if programs are to be met, a WPB official emphasized.

▶▶▶ AT A JOINT MEETING of the Kraft Paper and Sulphite Paper Industry Advisory Committee, an announcement from the WPB stated that kraft pulp and paper will continue in extremely short supply throughout the third quarter because of increased demands of the Armed Forces.

MEN LEAVE WASHINGTON— RETURN TO INDUSTRY JOBS

Some important changes in Washington Government personnel affect men from the paper industry. Grant Richardson, of Hammermill, after a month as Assistant Director of the Paper Division of the Forest Products Bureau, has become Director, Walter Wilcox returns to the S. D. Warren Company. Allan Hyer, former chief of the Distribution Section, handling machinery, has returned to the Black-Clawson Company as vice president. Henry Waldo is returning shortly to the Parker-Young Company after service in the Pulpwood Pricing Section of OPA.

John Maloney, industrial specialist in the Tissue Paper Section of WPB, returns to the Hoberg Paper Mills as sales manager. Philip A. Bachelder, formerly with the S. D. Warren Company, has resigned as chief of the Fine Papers and Printing Section of the OPA Paper and Paper Products branch and will join the Kimberly-Clark Corporation at Neenah.

"A BIT OF HISTORY" OF THE CRYSTAL TISSUE CO.

The Crystal Tissue Company, of Middletown, Ohio, has combined its three house organs—*The Wrapping Desk, Tissue Town Talk,* and *The Brokebox* into one special edition which marks the company's silver anniversary.

This special number, "25 Years of Progress," highlights the history of the company, with many pictures of its mill development and personnel. The following material is reproduced from "A Bit of History," as it appears in the publication mentioned.

Back in 1827, because of the abundant water power supplied by the Miami and Erie Canal a saw mill was started on the site now occupied by The Crystal Tissue Company. Those were pioneering days when sawmills to convert the forests into lumber for homes and farm buildings were one of the first thoughts of the settlers. As the country became more settled the demand for lumber decreased and at the same time the establishment of farms created a new demand for a mill to grind flour. Consequently, the sawmill was converted into a flour mill.

The operation of the flour mill continued almost without interruption until 1886 when it was converted into a strawboard paper mill, still using as raw material the product of the local farmers.

The first operation of the Crystal mill as a maker of tissues came a few years later when Dr. Thornton, principal of a high school in Cincinnati, Ohio, took charge of the plant and began the manufacture of light weight papers. This venture was not successful and the mill was closed for several years until in 1894 it was reopened by J. W. Van Dyke and operated by him as The Crystal Paper Company.

In 1902 Mr. Van Dyke, later president of the Atlantic Refining Company of Philadelphia, Pennsylvania, who was in financial control of The Crystal Paper Company, prevailed upon Mr. D. E. Harlan to take over the management of the company.

In 1905 an 80-inch machine was added. An 80-inch machine means that the machine would finish a sheet of paper 80 inches wide. Sixty-inch machines were considered standard in the tissue paper industry for many years, but mechanical improvements had been made until this width had grown to 80 inches.

In 1906 one of the old cylinder machines was replaced with a 100-inch machine. When Mr. Harlan tried to place the order with the paper ma-

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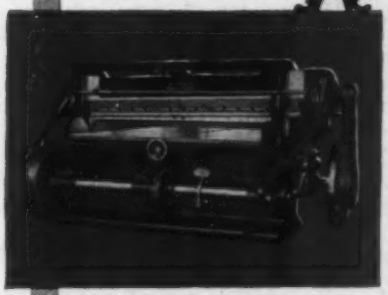
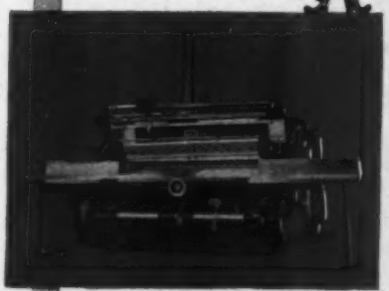
For speed—super fine!



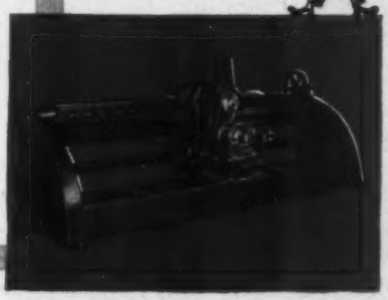
SPACER

For making a series
Of accurate *cuts*
I'm a time-saving guy
With plenty of guts!



GRINDER

Keen, true edges
That's my trade
With minimum waste
On any straight blade!



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chinery manufacturer for a 100-inch machine, the manufacturer emphatically refused to accept any responsibility for the performance of the machine.

After talking it over, Mr. Harlan told the manufacturer to go ahead and build that machine as he specified it, and that he would take the responsibility for the outcome. The machine was built. It was installed and it was made to work. And from that day on, the width of tissue paper machines has grown until today light weight tissue paper is made 168 inches wide.

The Crystal Paper Company was now operating three machines, a 60, 80 and 100-inch. But still this was not enough to take care of the rapidly growing business. So, the years 1911 and 1912 saw construction of a new mill and into this new mill went a 120-inch machine, the widest light weight Cylinder tissue paper machine in the world.

In 1920 occurred a new epoch in the history of The Crystal Paper Company. When Mr. Harlan was manager of the Lima Steel Casting Company of Lima, Ohio, back in 1900 Z. W. Ranck was his pattern boy, and general office boy. When Mr. Harlan came to Middletown to manage The Crystal Paper Company he sent for Mr. Ranck to be his bookkeeper. When Mr. Harlan retired in 1920, he made it possible for Mr. Ranck to take over the management of the institution that he had served so long and faithfully. During those years Mr. Ranck had most admirably equipped himself to take over this leadership. As an indefatigable worker he had not only found time to keep books, but he had found time to familiarize himself with all the details of each department.

Mr. Ranck organized the present Crystal Tissue Company on July 1, 1920, and took over the active management.

Wider markets for tissue papers were developed during the years following 1920 necessitating expansion of the equipment of the Crystal mill. To keep ahead of this demand and to keep the mill up to date, many changes and additions were made. In 1923 a 120-inch cylinder machine was added and in 1927 a 100-inch Fourdrinier machine and in 1930 a 120-inch Fourdrinier. These machines were designated as Nos. 5, 6 and 7 and completed the complement of machines now in use, making tissues of all grades.

In 1939 Mr. Ranck died and was succeeded as President of the company by Mr. E. E. Grant who has been with the company since 1921. At the same time Mr. L. J. Long, who started with the company in 1920, became Vice President and General Manager, and Miss E. A. Cahill, now Mrs. E. A. Homan, who has been with the company since 1913 became Secretary and Treasurer.

This management group has continued the polices established by Mr. Ranck and the company has made steady progress in physical, financial and personnel aspects. The ideals of the founder, to make the finest paper possible, to have workers who are happy on the job, have been constantly in the minds and actions of the present management.

◆

FINANCIAL

With stock market prices reaching the highest point in the last eight years paper mill securities generally followed the trend there being few cases where June prices were below those prevailing in May.

Albemarle Paper Manufacturing Company—Net income for the first quarter was $125,636, as against $134,787 for the same quarter in 1944.

American Box Board Company—An issue of $1,750,000 in twenty-year 4½ per cent convertible debentures will be used to redeem about $750,000 in outstanding 7 per cent debentures and for plant improvements.

A.P.W. Paper Company—Net income for 40 weeks ending April 7 was $87,597, as against $57,481 for the comparable period in the preceding fiscal year.

Champion Paper and Fibre Company—Net income for the fiscal year ending April 29 was $1,803,864, as against $1,970,427 for the previous fiscal year. The company has announced plans for the issuance of $13,000,000 of 20-year debentures and 100,000 shares of a new cumulative preferred stock. Action on the proposed issues is subject to a forthcoming special meeting of stockholders.

Gaylord Container Corporation—Net first quarter income was $262,364, as against $268,799 for the same quarter in 1944.

Lily-Tulip Cup Corporation—Net profit for the first quarter was $195,197, as against $153,652 for the same quarter in 1944.

National Container Corporation—Net profit for the first quarter was $303,426 as against $258,787 in the same quarter of 1944.

Puget Sound Pulp & Timber Company—Net first quarter profit was $295,295, as against $133,245 for the same quarter of 1944.

Southern Advance Bag & Paper Company—Net income for the first quarters of this year was $113,694.

Union Bag & Paper Corporation—Net income for the first quarter was $538,637, as against $423,236 for the same quarter of 1944.

West Virginia Pulp & Paper Company—Net income for three months ending April 30 was $607,045 as against $586,802 for the same quarter of the previous year. Six months net income ending April 30 was $1,145,783, against $1,210,634 in the previous year.

New York Stock Exchange—Stocks

	Closing Prices June 25	May 25
A.P.W. Products..	7	*4¾-5¼
Celotex	17⅜	17
Same Preferred..	*20¾-21¼	20¼
Certain-Teed Products	11	11⅛
Same Preferred..	160	*153¼-54
Champion P & F Co	37	34½
Same Preferred..	110⅛	113½
Container Corp....	29½	28⅜
Cont. Diamond....	13½	12
Crown Zellerbach..	23¾	24⅞
Same Preferred..	103½	103⅜
Dixie Vortex.....	29	25
Same "A"	48½	48
Robert Gair	7¼	5⅞
Same Preferred..	18⅜	17¼
Gaylord Container.	*28¼-28½	28¾
Same Preferred..	60	64
International Paper.	28½	29¼
Same Preferred..	98½	96⅜
Kimberly-Clark ...	*48-48½	*47-47½
McAndrews & Forbes	33	*33-34
Masonite	44½	45½
Mead Corp.....	15⅛	15¾
Same Preferred.	*103½-104	102
National Container.	15⅜	16
Paraffine Cos.....	*67-70	65
Same Preferred..	108	109
Rayonier Inc.....	21¾	18⅛
Same Preferred..	36¾	35½
Scott Paper	49	49
Same 4½% Preferred	*112-113½	*110-113
Same 4% Preferred	112	110½
Sutherland Paper...	33½	33
Union Bag & Paper	18	16⅞
U. S. Gypsum....	*92⅛-94	88
Same Preferred..	*190-193	*192-195
West Va. P&PCo..	31	25½
Same Preferred..	110	*109½-110½

New York Stock Exchange—Bonds

Abitibi 5%	103	107½
Celotex 3¾%.....	....	....
Certain-teed 5½%.	....	....
Champion P&F Co.	....	....
International Paper Co., 5%	....	....
Same 6%.....	....	....

New York Stock Exchange—Stocks

Am. Writing	9⅛	9½
Great Northern...	41¾	....
Hummel Ross	9¼	8⅜
Pug. Sound	17⅛	16½
St. Regis	7½	5¾
Taggart	6¾	....
United Wall Paper	5⅛	5

* Closing Bid and Asked Prices.

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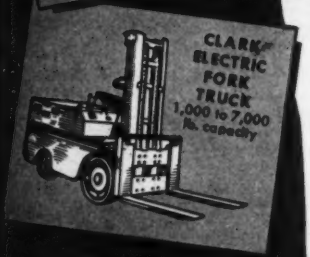

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INDUSTRIAL TRUCKS AND TRACTORS • HIGH-SPEED DRILLS AND REAMERS
METAL SPOKE WHEELS • GEARS AND FORGINGS • RAILWAY TRUCKS

CAN. WARTIME PRICES AND TRADE BD. AND U. S. WPB HOLD JOINT MEETING

During the first week of June, Montreal was the scene of a two-day conference between representatives of the U. S. War Production Board (publishing and printing division), the Canadian Wartime Prices and Trade Board, and Canadian pulp and paper manufacturers. The main purpose of the meeting was to thresh out the question as to the proposed supply of 30-lb. newsprint instead of the present standard 32-lb. paper, which some American publishers have favored so as to get more printing surface from the same total weight of paper.

The pros and cons of the proposal were thoroughly and frankly discussed, and while no decision was arrived at, it was agreed that the meeting had been thoroughly worth while and had resulted in a complete understanding of the technical problems involved. At the close of the conference the U. S. representatives stated that they would prepare a report on the matter, to be presented at an early meeting of the full committee of the publishing and printing division at Washington. The decision on the matter will therefore come from that committee, and may be announced from Washington in the near future.

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N. Y. STATE COLLEGE OF FORESTRY WILL HAVE NEW LABORATORY BUILDINGS

The New York State College of Forestry announces that an architect has been engaged by the State to draw up plans for the two new laboratory buildings—the Paper and Plastics Laboratory and the Wood Products Laboratory. The estimated cost of these two laboratories is $744,100.

In addition to these two laboratory buildings, plans for a third new building — General Forestry — are about ready for consideration by the State.

◆

WESTMINSTER PAPER CO. EXPANSION DELAYED BY SHORTAGE OF MATERIALS

Difficulties in obtaining building materials and machinery are the only factors delaying the million-and-a-quarter dollar expansion of the Westminster Paper Company, Ltd., New Westminster (B. C.). The development planned by the directors will more than double the capacity of the plant. The new wharf already is being completed and will provide direct loading facilities for ocean-going vessels at the plant. The new office

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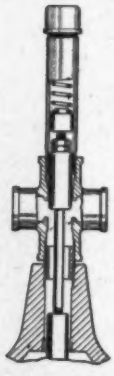

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At last . . . the Check Valve that provides *controlled* surge protection. The Clayton HYDROMATIC Check Valve is entirely hydraulic in operation. It cannot slam. It positively prevents surge.

The HYDROMATIC Check Valve operates like a hydraulic door closer. In closing, the final action is throttled, thus effectively preventing surge. The opening operation is similarly controlled. Action in either direction starts by equalizing pressures gradually, without shock or water hammer.

Pressure to open and close the valve is directed through the SURGEMASTER Control which is adjustable to permit changing the speed of opening and closing to meet all conditions.

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CLAYTON
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and administration building will be erected across the road from the main plant on acreage which was recently acquired by the company.

The firm is also taking over the site now used by the plant of the Fraser River Pile Driving Company to the west of the paper mills and is leasing a short street end from the city to be used in its expansion plans.

◆

SOME PROVISIONS OF REORGANIZATION PLAN OF ABITIBI DISCLOSED

The plan of reorganization of the Abitibi Power & Paper Company, it has been disclosed, provides for payment by the company of all expenses in connection with the reorganization including compensation for the trustees as well as the receiver, manager and liquidators together with their expenses. The costs and expenses arising from the appointment and work of the Hughes Committee as well as compensation for the members of the Committee will also be paid by the company.

The committees representing the bondholders and the preferred and common stockholders and the unsecured creditors will be reimbursed for the costs and expenses only.

◆

▶▶▶ AT ITS MEETING in Quebec on June 4, the Quebec section of the Canadian Society of Forest Engineers adopted unanimously a resolution endorsing representations made by the Society urging the release of much needed forest engineers from the Armed Forces. A resolution was also passed asking that the Quebec Department of Lands and Forests undertake immediate aerial surveys of all forest resources in the Province for the purpose of enabling sound syvicultural methods to be taken.

◆

▶▶▶ THE OFFICE OF Donnacona Paper Company in Quebec soon will be housed in the former residence of the Duke of Kent. Located on St. Louis Street near the Chateau Frontenac, it is one of the oldest in Quebec. The walls date back to the French regime and it is said it was there the city's capitulation was signed in 1759. The inside will be modified to suit the new requirements, but the outside will not be changed.

◆

▶▶▶ A MAJOR INTEREST in the Bartgis Brothers Company, Ilchester, Maryland, has been purchased by the New Haven Pulp and Board Company, New Haven, Connecticut.

CANADA'S NEWSPRINT SHIPMENTS TO THE U. S. HAVE BEEN INCREASED

Effective July 1, Canada has increased its monthly supply of newsprint to the United States from 200,000 to 220,000 tons. The announcement followed a meeting of the War Production Board's newspaper industry advisory committee. It was also announced that paper shipments from Canada and the United States to Europe would be stopped and that European publishers would be supplied entirely with Scandinavian news print. This will save Atlantic shipping space and retain assured deliveries to Canadian and American publishers.

A report by the committee's task group recommending continued use of 32-lb. newsprint rather than for making provision for use of 30-lb. paper, was approved. The increase in the amount of Canadian newsprint shipped to the United States will not affect supplies to Canadian newspapers.

◆

▶▶▶ AN OUTBREAK of Dutch elm disease has occurred in the Lake St. Peter area of Quebec Province, about 100 miles northeast of Montreal, where a considerable number of trees already have been destroyed. To prevent its spread in Canada, the Dominion Department of Agriculture, working in co-operation with the Quebec Department of Lands and Forests has established a quarantine which prohibits the transportation of elm trees, nursery stock, or elm lumber from the district affected.

◆

GAIR SANTEE CORP. IS A NEW SUBSIDIARY OF ROBERT GAIR COMPANY

A new company known as Gair Santee Corporation, has been incorporated under the laws of the State of Delaware. The new company, which is a wholly owned subsidiary of Robert Gair Company, Inc., has opened an office at Orangeburg, South Carolina, and is now engaged in the acquisition of timberlands and stumpage under the direction of T. W. Earle, vice president, who will give special attention to timber conservation, forest management, and fire prevention. When materials are more readily available, the company contemplates the erection of a sulphate pulp and paperboard mill, producing both bleached and unbleached kraft pulp and paperboard.

Officers of Gair Santee Corporation are: President, George E. Dyke; vice president in charge of wood and lands, T. W. Earle; secretary, Parker Newhall; treasurer, T. Raymond Pierce.

Consistently Outperforms and Outlasts Lighter Pumps on

BLACK LIQUOR

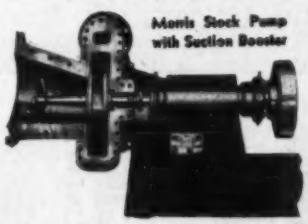
MORRIS

TYPE "S" SLURRY PUMPS

Are you troubled with rapid wear and frequent renewals of your black liquor pumps? Are you limiting yourself to sustained capacity over a period of weeks instead of months? You'll find Morris "type S" Slurry Pumps consistently outperform and outlast lighter pumps.

EASY FLOW WITHOUT CHOKING

Morris suctions of large diameters and impellers with easy entrance curves permit flow of thick mixtures without choking or excessive friction. The patented *balanced pressure* design of the impeller reduces leakage and eddy losses, keeps destructive quantities of corrosive liquors and gritty particles from circulating between the impeller and the suction disc. Renewable disc liners and throat ring, plus an external lateral shaft adjustment, assure a longer period of maximum capacity and efficiency, cut maintenance and replacement costs and shorten service interruptions. Overall costs are lower, the effective life of the pump is longer, and the rate of efficiency-loss is definitely slower.



Morris Stock Pump with Suction Booster

Prepare now to benefit from Morris pumping economy as soon as wartime pressure lets up. Write today for Slurry Pump Bulletin No. 173.

Consult Morris engineers regarding all your pump problems. No charge. No obligation. Just write

MORRIS MACHINE WORKS
BALDWINSVILLE, N. Y.
Sales Offices in Principal Cities

MORRIS CENTRIFUGAL PUMPS

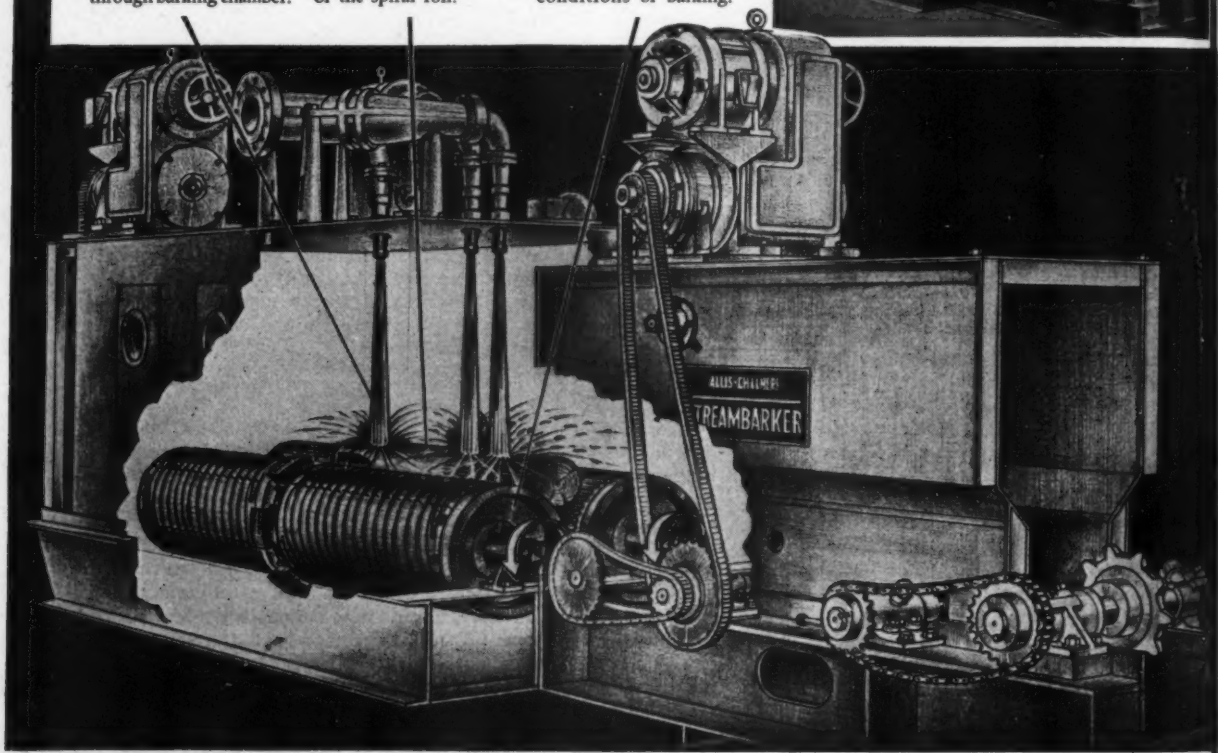
IT PAYS PULP AND PAPER MEN

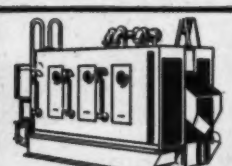
"Streambarker

SECRET of new A-C Streambarker is *water*—delivered at 600 gpm through a high head, centrifugal 4-stage pump—and *forced at 650 lbs pressure* through 3 specially designed nozzles located directly over the axis of logs moving through barking chamber.

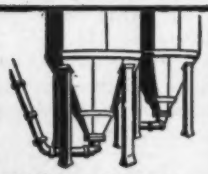
BARK IS REMOVED by *erosive* action. Streams of water from the first 2 jets *blast bark away* from the log. Water from the third jet washes away the cambium which is loosened by a six-section adjustable steel wire brush located in center of the spiral roll.

THESE 2 BED ROLLS — one fluted, the other spirally threaded — *revolve* and *propel* logs forward at a pre-determined rate. Roll speeds are regulated by *individual adjustable speed* drives. Thus, *rate can be changed* to suit new conditions of barking.

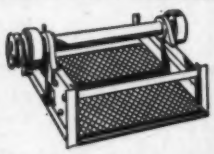




PREPARATION — Hydraulic Barkers, Chip Screens, Saws, Slashers, Interplane Grinders.



COOKING — Digesters, Blow Tanks, Kilns, Slakers, Heat Exchangers, Condensers.



WET ROOM — vibrating-type screens for use as Thickeners, for dewatering rejects.

PAPER-MAKING — special design Drives for Paper Machines, Rewinders, Calenders.

ALLIS (A-C) CHALMERS

TO KNOW THE

Secret..."

Water, at 650 lbs Pressure, Barks Logs Clean, With No Dirt, No Rot, in Revolutionary "Streambarker"—Saves Average U. S. Mill up to $69,000 a Year in Brooming Losses Alone!

AND WHEN YOU ADD *other* important Streambarker benefits — in *conserved manpower*, in *lower initial and installation costs*, in *more valuable use of mill space* — the final saving is even higher! Now, let's take a look at brooming losses:

The average U. S. Pulp Mill, based on current industry statistics, uses 48,142 cords of "rough" pulpwood annually. Its brooming losses range from 2% to 15%. A typical figure, 6%, works out to 2,888 cords. At $24 a cord, that means a total loss of $69,312 a year through brooming alone . . . *a loss which can be entirely eliminated with the new "Streambarker"!*

Why not substitute *your own* figures . . . see how much A-C "Streambarker" can save for *you!* And for more facts, write or call for Bulletin B6341. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

HERE'S WHAT "STREAMBARKER" MEANS TO YOU:

- **BIG PRODUCTION**—a minimum of 10 cords per hour, based on 90, four-foot sticks per cord!
- **MANPOWER SAVINGS** —For example, one 100 ton mill has transferred 9 men from wood room to other important jobs!
- **WOOD SAVINGS** — 150 ton mill can save $100,000 a year in brooming alone!
- **SPACE SAVINGS** — compact Streambarker saves valuable wood room space!
- **LOWER COST** — total cost is less than for conventional barking equipment!
- **BETTER GRADE PULP**— because wood through "Streambarker" is sound, clean—free from dirt and rot!
- **SPEEDED OPERATION** — "Streambarker" lowers dirt count. The result is less work and more speed for diaphragm screens!

DEVELOPMENT NEWS

POST-WAR OUTLOOK for Sulphate Mills, both in U. S. and Canada, points to a large program in *modernization* of present lime recovery systems, *expansion* of facilities, and *new mill* construction.

Sulphate pulp tonnage, which has tripled in the past 10 years, increased 14% since the last peace year, is expected to *go on increasing* after the war. Still another factor, the return of *competitive production* with emphasis on lower costs, will weaken the position of many normally marginal mills who overlook the trend.

7 by 120 ft A-C Kiln for Southern Sulphate Mill.

SIGNIFICANT PART Allis-Chalmers will play in this program is shown in the history of Lime Sludge Kiln sales during past 5 years. *Of 7 kilns sold to Sulphate industry, 6 were Allis-Chalmers' design!* Here are some reasons:

1) Since 1900 A-C has built the majority of rotary kilns used in *all* U. S. industry; has designed them for *continuous* 24-hour-a-day, 7-day-a-week operation and for *minimum* maintenance.

2) The Allis-Chalmers patented Chain System *increases lime production* as much as 10%, *reduces fuel consumption* by as much as 30%!

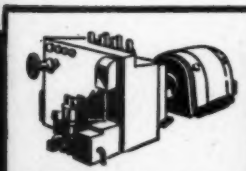
3) A-C kiln shells are rolled *one plate to the circle*, as contrasted with competitive 3-plate to the circle design. Result: A-C kiln shells are more perfectly circular, permitting *better lining installation, longer lining life!*

4) Complete A-C kiln installations give operators *close control* over lime sludge reburning, and a *uniform product* of high quality that enables maintenance of *optimum conditions* in their particular cauticizing operation.

Centralized Kiln Control increases efficiency.

For additional information on kilns, slakers ...other A-C equipment for the Pulp and Paper industry, contact our nearby district office, or write to ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 1852



POWER — all types of Power Generation, Distribution and Control Equipment.

MOTORS & CONTROLS — all types a-c and d-c Motors, ½ to 7000 hp — Gearmotors.

TEXROPE V-BELT DRIVES — fractional to 5000 hp — Constant and Adjustable speed.

PUMPS — Single & Multi-Stage, 10 to 150,000 gpm — Paper Stock Pumps, Fan Pumps.

MILWAUKEE 1, WIS.

3000 POUND LOADS OF PAPER *Easily Moved* BY ONE OPERATOR..

Paper on its way to the presses

Skid load of paper being maneuvered into position, simply, easily, and quickly for storage.

ELECTRIC PROPELLED

TRANSPORTER

NO STRAINING • NO TUGGING
NO PUSHING • NO PULLING

The movement of large pallet loads of paper from receiving room to presses — with intermediate handling — is simplified at the plant of the Duncan Lithographing Company, Ltd., Hamilton, Canada.

The Electric-Propelled, Battery-Powered, Streamlined, and low cost performing TRANSPORTER is the answer. In this operation, like others in various industries, the TRANSPORTER quickly pays for itself. In transporting paper for Duncan, the TRANSPORTER does the work of 3 to 4 men.

The use of the TRANSPORTER means safety for the operator and prevents fatigue.

- **Positive Mechanical Brake with Emergency Control**
- **Controls in Steering Handle**
- **Forward and Reverse Speeds**
- **Front Wheel Power-Drive**
- **Shockless Hydraulic Platform Lift with Easy Foot Control**

MANUFACTURERS FOR OVER 30 YEARS *Electric Propelled* INDUSTRIAL TRUCKS

ELECTRIC INDUSTRIAL TRUCKS
MEMBER OF ELECTRIC INDUSTRIAL TRUCK ASSN.

AUTOMATIC TRANSPORTATION CO.
113 WEST 87th STREET CHICAGO 20, ILL.
Division of the Yale & Towne Manufacturing Company

OLIVER SAVEALL

3 Types of Dischargers

- HYDRAIR
- OLIVER DENHARD
- DISCHARGE ROLL

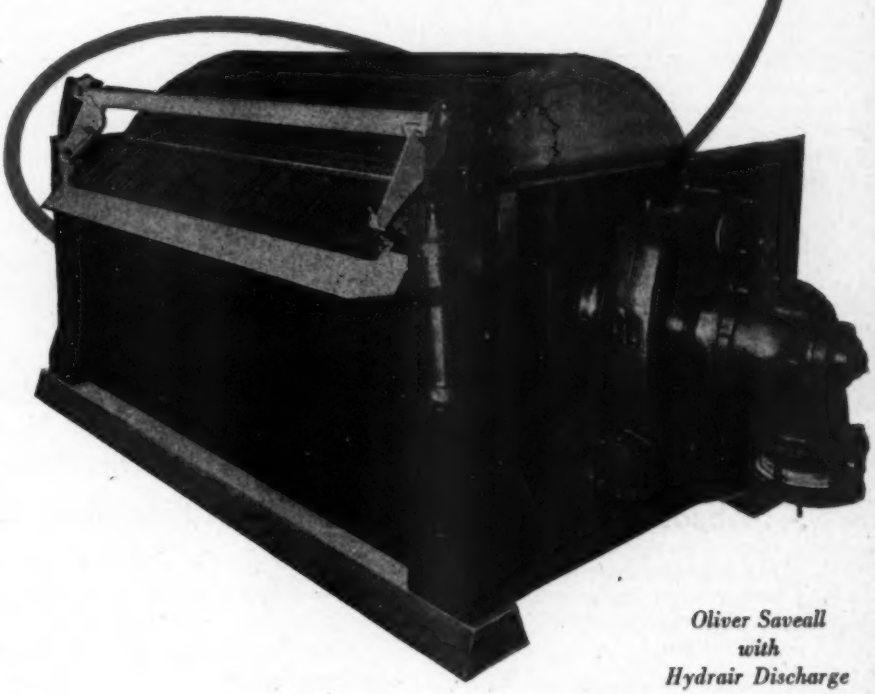
IN A VACUUM SAVEALL the sheet discharger is important because efficient removal of the stock from the drum is necessary for uniformly high capacity.

The purchaser of an Oliver Saveall gets the proper discharger for best operation on his particular stock.

1. Hydrair—A doctor with a series of water jets beneath so directed as to create a pressure under the sheet lifting it off the wire onto the doctor.

2. Oliver Denhard—Forms the sheet into a roll which couches the sheet off the wire. A scroll continuously removes the stock. Nothing touches the wire except the sheet.

3. Discharge Roll—Leads sheet from the drum over a driven fluted discharge roll.



Oliver Saveall with Hydrair Discharge

The purchaser has his choice of Rubber Covered or Cast Iron-Wood Stave construction. He gets the advantage of the Oliver Automatic Drum Speed Control (actuated by liquid level in the vat). He also gets a Saveall that operates with consistent results without the need of technical attention.

* * *

Today's Oliver is the practical saveall for the mill aiming for maximum recovery of fibers at the lowest possible cost.

OLIVER UNITED FILTERS INC.

New York 18, N. Y.
33 West 42nd Street

San Francisco 11
California

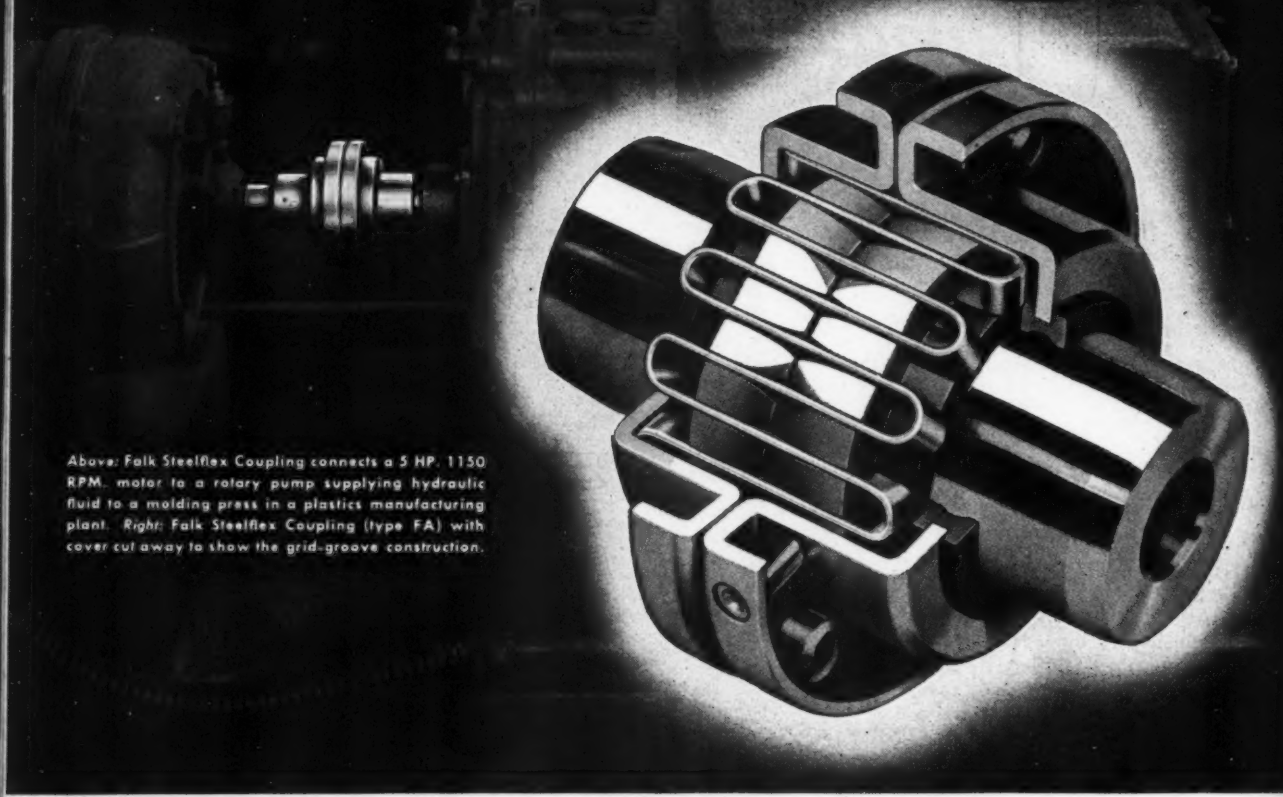
Chicago 1, Illinois
221 N. LaSalle Street

Western Sales Division
Oakland 1, California
2900 Glascock Street

Canada: Sales & Manufacturing Representative: E. Long Limited, Orillia, Canada

Factories: Oakland, Calif., Hazleton, Pa., Orillia, Canada, Melbourne, Australia

How about



Above: Falk Steelflex Coupling connects a 5 HP. 1150 RPM. motor to a rotary pump supplying hydraulic fluid to a molding press in a plastics manufacturing plant. *Right:* Falk Steelflex Coupling (type FA) with cover cut away to show the grid-groove construction.

Flexible and Resilient Grid-Groove Design Effectively Cushions Loads ... Absorbs Shocks ... Adjusts for Misalignment ... Provides for End Float

FALK Engineers have long recognized the importance of, and necessity for, connecting the shafts of a driving and a driven member by a coupling that is both flexible and torsionally resilient.

As pioneers in the design and manufacture of precision gear drives, these engineers know that a coupling must be resilient to the degree that it definitely improves the character of the motion imparted to it.

This qualification extends beyond the mere connecting of shafts under slight angular and parallel misalignment without imposing undue loads on the bearings and shafts of connected machinery—which is the ordinary concept of coupling design.

In addition to providing flexibility and torsional resilience, proper coupling design dictates the use of materials that will insure years of trouble-free service.

Therefore Falk Steelflex Couplings provide both essentials of desirable coupling performance, insuring *both* flexibility and the torsionally resilient action that so effectively cushions loads, absorbs shocks, dampens vibration, adjusts for angular and parallel misalignment, and allows free end float for the shafts of driving and driven members.

How and why Falk Steelflex Couplings do all this is explained on the opposite page. Here, indeed, is a short course in efficient coupling design.

THE FALK CORPORATION, MILWAUKEE 8 WISCONSIN

For over fifty years precision manufacturers of Speed Reducers . . . Motoreducers . . . Flexible Couplings . . . Herringbone and Single Helical Gears . . . Heavy Gear Drives . . . Marine Turbine and Diesel Gear Drives and Clutches . . . Contract Welding and Machine Work. • District Offices, Representatives, or Distributors in principal cities.

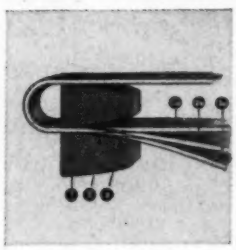
IT ALWAYS PAYS TO CONSULT **FALK**

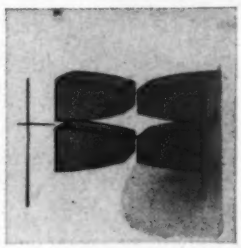
a short course in

Coupling Design?

WHY and HOW Falk Steelflex Couplings Perform Better

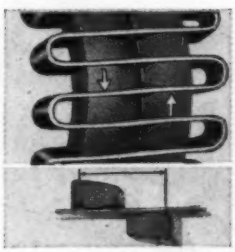
HOW THE GRID-GROOVE DESIGN FUNCTIONS. Power is transmitted through a resilient grid member made of chrome alloy steel with an elastic limit of 225,000 pounds per square inch and an ultimate strength of 250,000 pounds per square inch. This grid fits snugly into curved grooves cut into the hubs of the coupling.

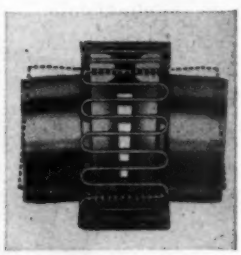




HOW THE GROOVES ARE DESIGNED. The identical hubs are moderately high carbon bar steel, forged steel, or Falk alloy cast steel. Into these hubs, grooves are cut in a precise arc, with radius and length proportional to the size of the coupling, to provide a snugly fitting slot for the grid member and a bearing surface from outer to inner edge of the hub.

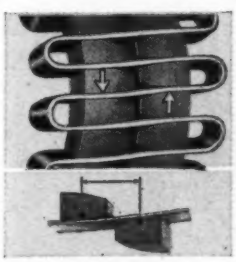
AT LIGHT LOADS, the grid member bears only at the outer edges of the curved grooves in the coupling hub, as shown at right and at *1* and *1a* in the diagram above. This permits a long, free elastic span between the outer edges of both hubs. Power is transmitted through almost the entire length of the resilient rungs of the grid member.

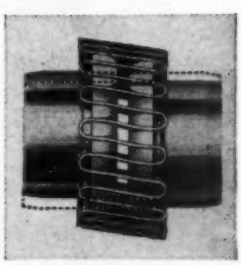




ANGULAR MISALIGNMENT. Under angular misalignment the design of the Falk Steelflex coupling permits a rocking and sliding action of grid and hubs that allows the greatest freedom of accommodation to angular misalignment, while at the same time transmitting the power through the resilient grid with no lost motion or backlash.

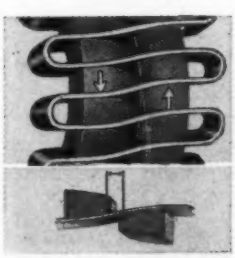
AT NORMAL LOADS, the grid bears on a larger area of the grooves (*2*, *2a* in diagram) and the span of the grid is automatically shortened as the load increases, enabling it to transmit more power without increasing internal stress. The grid member maintains its capacity to absorb shocks, dampen vibration, and cushion the load.

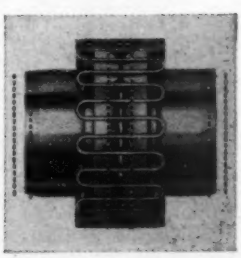




PARALLEL MISALIGNMENT. When parallel misalignment is involved, the resilience of the grid-groove combination comes into full play. The movement of the grid in the lubricated grooves accommodates the misalignment, while still permitting full function of the grid-groove action of the coupling in absorbing shock and dampening vibration.

AT PEAK LOADS, the rungs of the grid member then bear over almost the entire curved surfaces of the grooves (*3*, *3a* in diagram) and the span of the grid becomes very short. The coupling still remains torsionally resilient. Also under the impact of shock loads the grid member flexes and transmits power smoothly and evenly.





PERMITS FREE END FLOAT. Because the grid member slides freely in the lubricated grooves, the Steelflex coupling permits free and independent end float for the shafts of both the driving or driven members, or of either one. If it is desired that end float be restricted, provision can be made to limit it to any required amount.

There are 13 types and 33 sizes of Falk couplings to meet all requirements. For specific information and recommendations to meet your needs, call the nearest Falk representative or distributor.

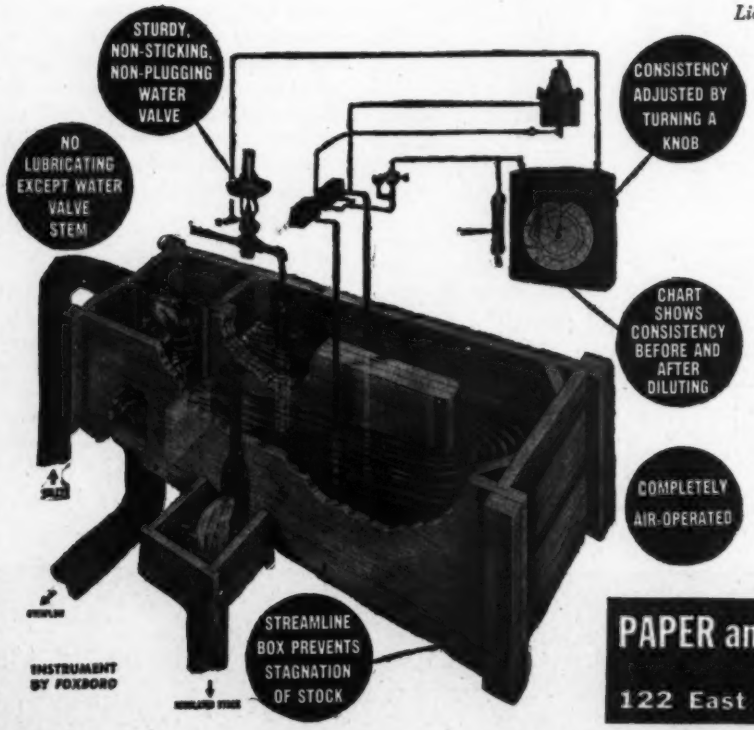
FALK ... A GOOD NAME IN INDUSTRY

CONTROLS CONSISTENCIES
from Cigarette Stock to Rag Stock

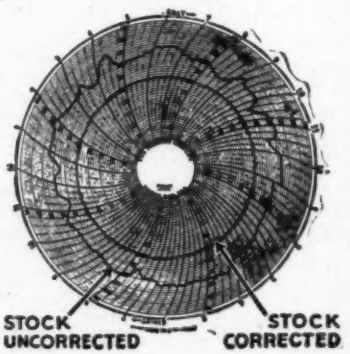
For Accurate Regulation of Consistency and Recording
Both Before and After Diluting Water Has Been Supplied

Affords the most accurate and dependable control and recording of consistency regulation of pulps, paper stocks, and viscous liquids. Successfully handles regulation of difficult stocks such as "lumpy" rag and free sulphite. Design is simple and unique . . . with important operating and economy features. Responds instantly to the slightest change in consistency. No moving parts eliminate need of lubrication (except control valve stem), and maintenance.

BRAMMER
RECORDING CONSISTENCY CONTROL


STURDY, NON-STICKING, NON-PLUGGING WATER VALVE
NO LUBRICATING EXCEPT WATER VALVE STEM
CONSISTENCY ADJUSTED BY TURNING A KNOB
CHART SHOWS CONSISTENCY BEFORE AND AFTER DILUTING
COMPLETELY AIR-OPERATED
STREAMLINE BOX PREVENTS STAGNATION OF STOCK
INSTRUMENT BY FOXBORO

Licensed under U. S. Patent Numbers: 1,810,111—1,884,075—2,302,326—2,302,327



24-hour record chart, showing consistency before and after diluting water has been supplied

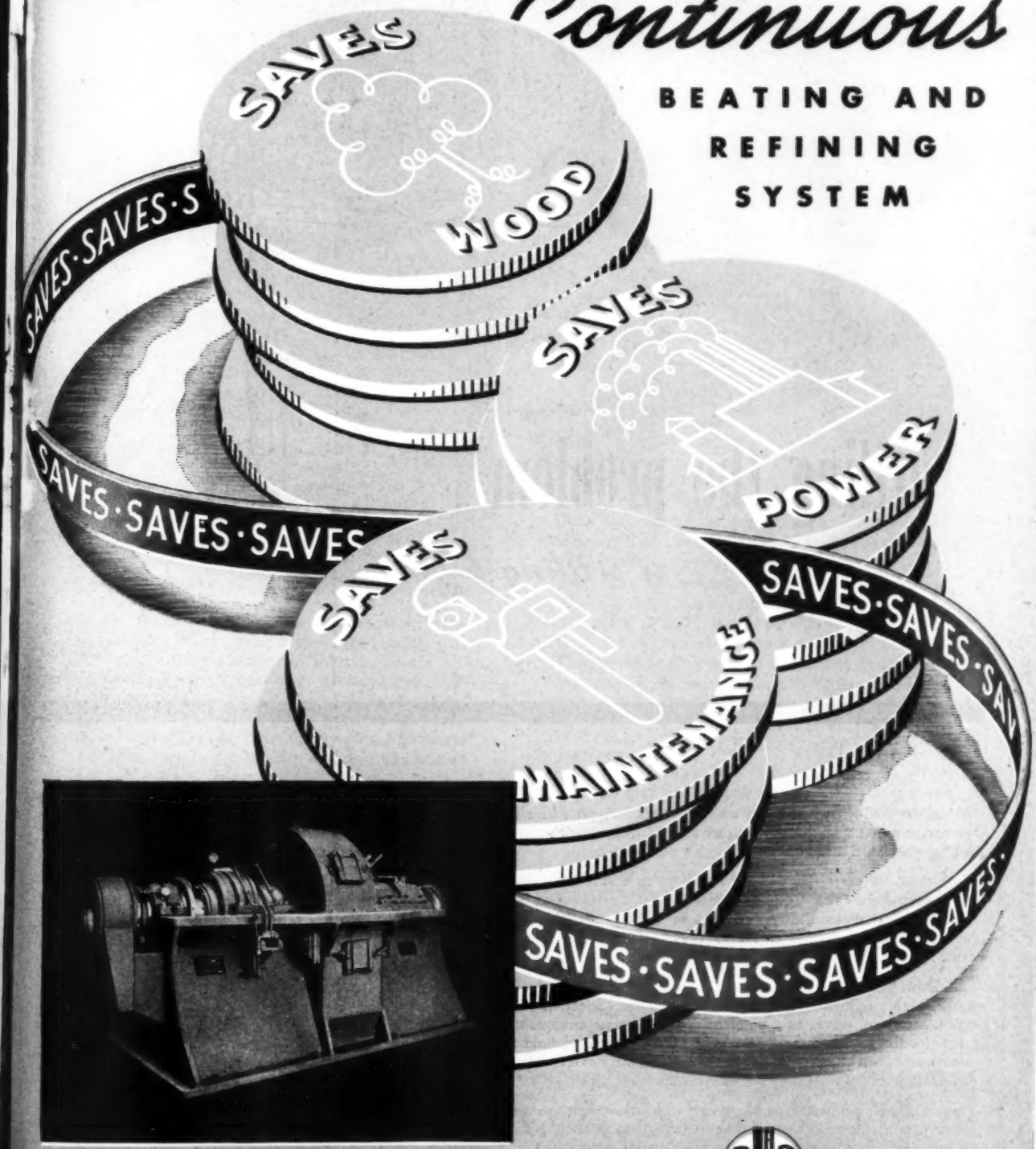
Write for Brammer Catalog

PAPER and INDUSTRIAL APPLIANCES
Incorporated
122 East 42nd Street, New York, N. Y.

SUTHERLAND

Continuous

BEATING AND REFINING SYSTEM



SUTHERLAND REFINER CORPORATION

TRENTON, NEW JERSEY

ONE OF 27 DOW CHEMICALS USED BY THE PAPER INDUSTRY

settling the problem

of settling pigments

Behind the well-known story of water extendable paints which have become so popular in recent years are important answers to development problems in many products.

Paint manufacturers face several problems in making water paints . . . pigments must not flood or settle and cake . . . emulsions must be stable . . . undue penetration of porous surfaces must be avoided . . . good adhesion to paper, wood, cement, and other surfaces is a necessity . . . good brushing characteristics are important.

The Dow Chemical Company has the answer—Methocel—a cold water soluble cellulose ether available in a wide variety of viscosity types. Methocel serves as a pigment disperser, thus minimizing pigment flooding, settling, and caking . . . its protective colloid action insures emulsion stability . . . its controlled viscosity overcomes undue penetration and gives excellent brushing characteristics.

These valuable properties of Methocel, which contribute so much to water extendable paints, may prove valuable to you, too. Write us for more information about Methocel.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago
St. Louis • Houston • San Francisco • Los Angeles • Seattle

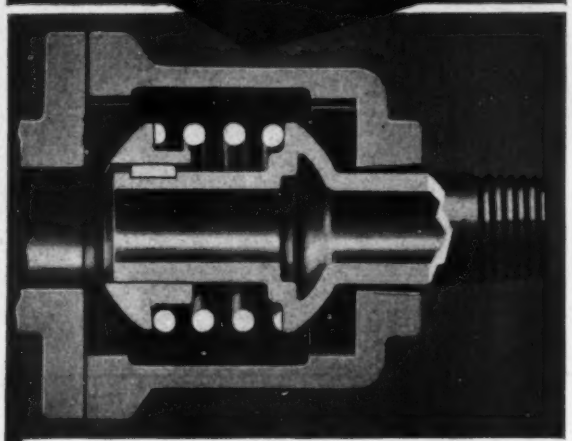
Methocel

Water Soluble Dow Methylcellulose

DOW

CHEMICALS INDISPENSABLE TO INDUSTRY AND VICTORY

JOHNSON Rotary Pressure JOINTS



• It's true in many cases — the most effective single step you can take to speed up lagging production is to switch over to Johnson Joints.

Their packless, self-oiling, self-adjusting, self-aligning design ends all the troubles of the old style stuffing boxes and steam fits. Precious man-hours can be released for other tasks. Efficiency-boosting methods of syphon drainage can be employed more satisfactorily.

Yet with all these benefits, the Johnson Joint can pay its own way out of savings in maintenance alone. That's the verdict of hundreds of mills, where scores of thousands of Johnson Joints are helping to meet today's unprecedented demand.

WRITE FOR COMPLETE INFORMATION

Don't overlook the JOHNSON ELECTRAP

It's replacing expensive pumps and cumbersome tilting traps . . . draining lines under vacuum as complete as 27 inches of mercury. Electrical method of operation brings greater capacity, absolute dependability, and permits remote control for those hard-to-get-at installations.

The Johnson Corporation

816 WOOD STREET (J) THREE RIVERS, MICHIGAN

Beat Competition by BEATING RUST

Plan your product to be a winner . . . . in the face of keen future competition . . . . by using Harper Everlasting Fastenings—the fastenings that (1) resist rust and corrosion, (2) stand up in the presence of many acids, alkalies and other tough conditions, (3) add years of service life AT LOW COST, (4) can be removed with ordinary tools and used again and again. Every Harper fastening is made of either brass, copper, naval bronze, silicon bronze, Monel or stainless steel (nothing in common steel).

4360 ITEMS IN STOCK

Harper is known as "Headquarters for Non-Ferrous and Stainless Fastenings" . . . . carries large and complete stocks of 4360 different items and is continually adding others . . . . maintains large stocks of metals in bars, rods, wire, sheet and other basic forms from which special fastenings can be quickly made. Write for 1945 Catalog.

THE H. M. HARPER COMPANY
2647 Fletcher Street, Chicago 18, Illinois

BRANCH OFFICES: New York City • Philadelphia
Los Angeles • Milwaukee • Cincinnati • Houston
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HARPER
EVERLASTING FASTENINGS

BRASS • BRONZES • COPPER
MONEL • STAINLESS

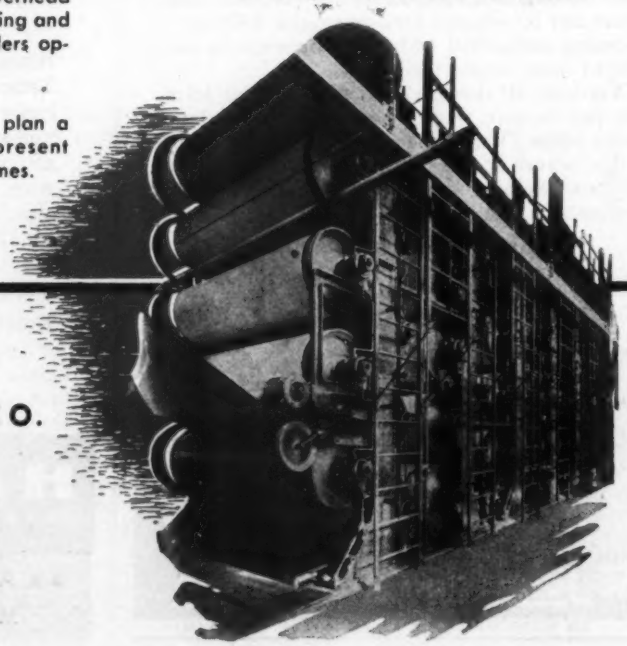
WHICH SHALL IT BE?

WHICH! A long drawn out horizontal dryer extending into the next county with machine and back tenders so far apart they have to wig-wag each other—or a Vertical dryer that shortens up the machine, utilizes overhead room, does a better job of drying and gives machine and back tenders opportunity to get acquainted!

WHEN! Today—now—is the time to plan a vertical section, using your present dryers but in new vertical frames.

WHY! Because the more modern and the more efficient your dryer, the better you'll fare in the years ahead. The same applies to your vat and press sections.

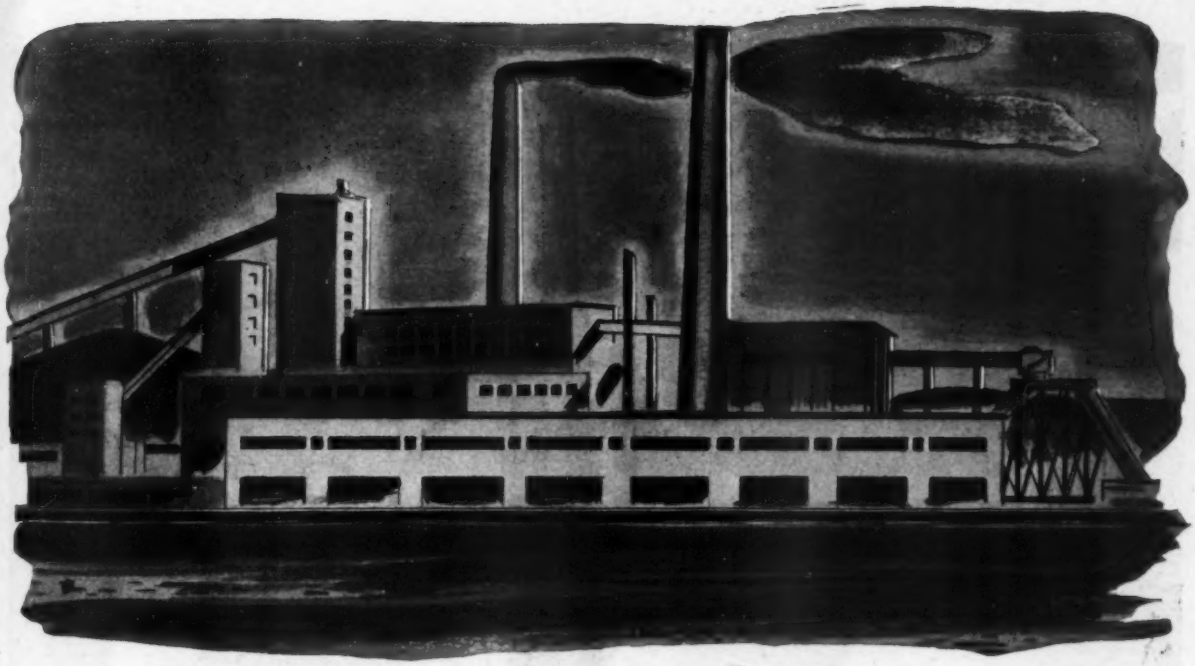
Verticals for practically all grades.



THE BLACK-CLAWSON CO.
HAMILTON, OHIO

Shartle Dilts

Divisions:
Shartle Bros. Machine Co., Middletown, Ohio.
Dilts Machine Works, Fulton, New York.



WHAT GOES ON IN THIS PAPER MILL...

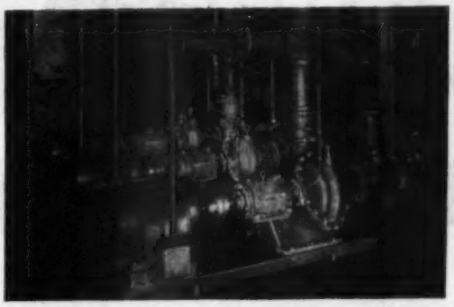
in addition to making paper?

Many paper mills today are *also* turning out chemical by-products of wood . . . such as tall oil, alcohol, resins, turpentine used in the manufacture of soaps, plastics, paints — to name a few. What new kinds of by-products will be made in paper mills of the future can't be said for sure right now.

What *is* certain is that the processing of chemical by-products calls for the right pumps — often specially-developed pumps — such as Worthington builds now . . . and *will* engineer to solve your future problems.

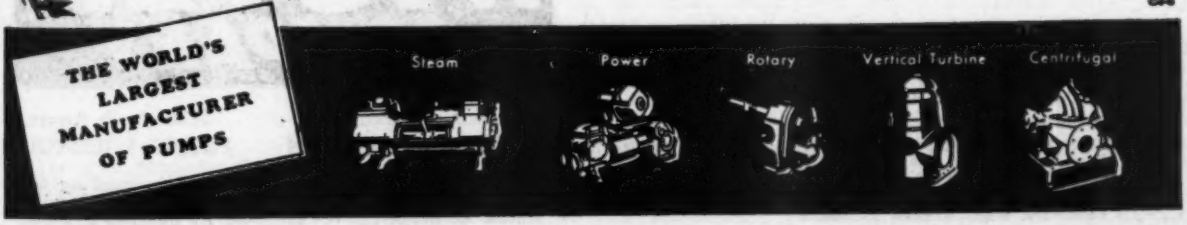
Worthington P.A.E.'s* offer the most in experience and know-how of pump application for all types of pulp and process problems. Worthington offers all types and sizes of centrifugal pumps to *overcome* these corrosion, abrasion, heat viscosity and solidification problems. If you need the right pumps now . . . or will need them after the war, you'll learn that *there's more worth in Worthington* by phoning our nearest office or writing to— *Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, N. J.*

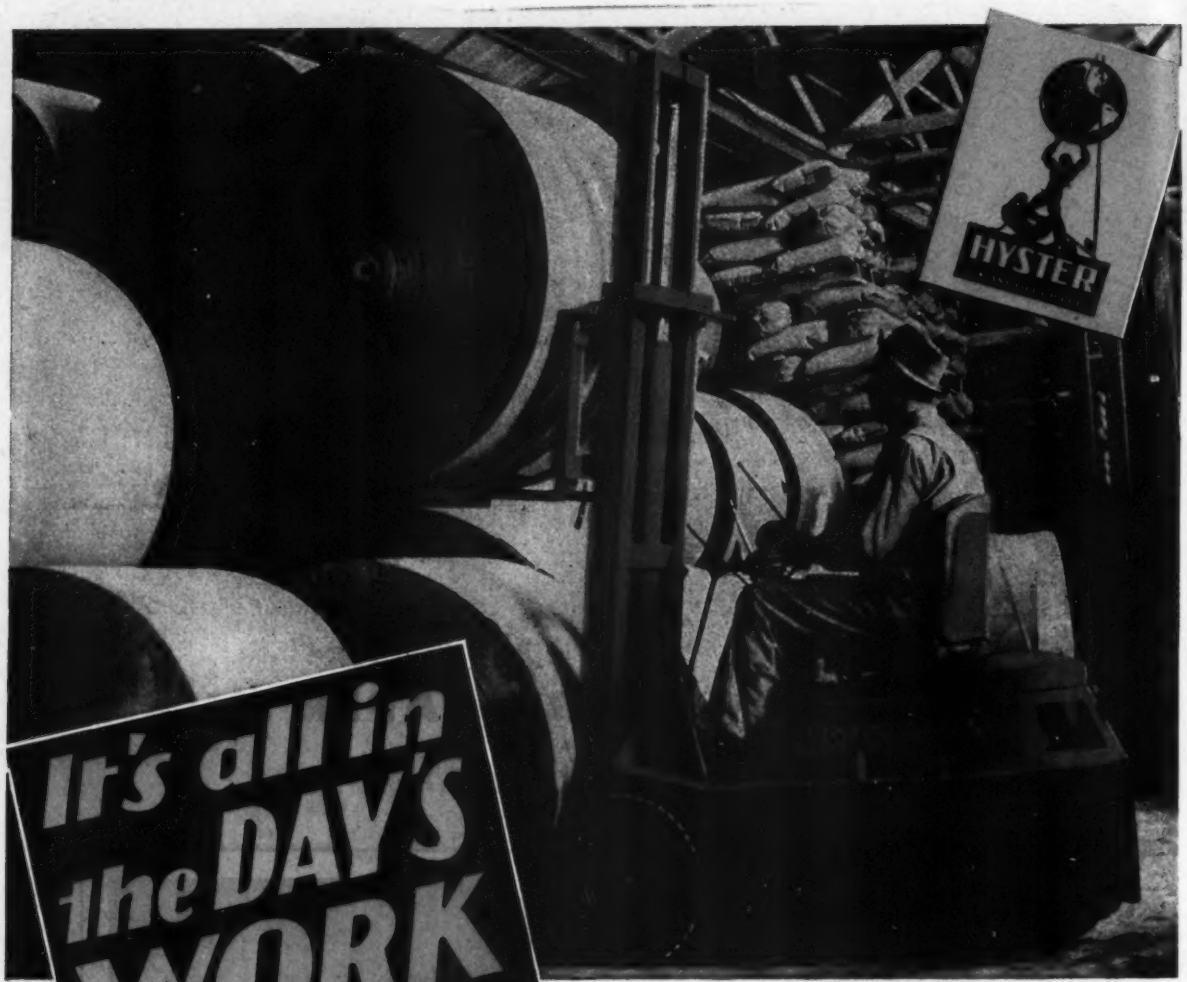
*P.A.E.—Pump Application Engineer.



3 of 6 Worthington thin Black Liquor Pumps in the Diffuser House of the North Carolina Pulp Company, Plymouth, N. C.

WORTHINGTON





It's all in the DAY'S WORK to the HYSTER 20

Tricky loads present no problem to this versatile HYSTER Fork Lift Truck. The HYSTER 20 lifts, transports and unloads materials of all kinds, on bare forks or pallets, up to its capacity of one ton.

A handy little rig to have around, the HYSTER 20 is kept busy all day long on every sort of hauling job. It goes everywhere on its easy-riding, traction-geared pneumatic tires. Its streamlined compactness takes it through narrow aisles and crowded quarters. With trunnion steering, it turns in its own length.

Controls are standard; anyone can operate it. The hydraulic lifting mechanism responds to fingertip pressure; loads may be lifted, lowered, tilted forward or backward while traveling if desired. And it tiers neat and high in storage. The HYSTER 20 travels equally well forward and reverse. Further details are covered in a new booklet. May we send it?

Other fork trucks in the complete HYSTER line handle loads to 15,000 pounds.

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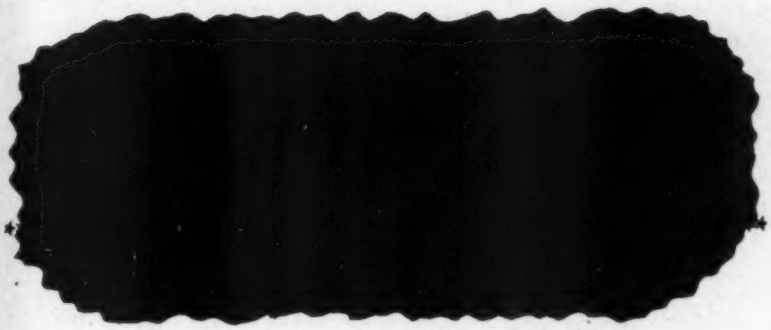
Pioneer manufacturers of mobile materials handling machines . . . Fork Lift Trucks, Crane Trucks and Straddle Trucks. All pneumatic tire mounted. All gasoline powered.



Huge Postwar Demands for Paper

▶▶▶ IT IS IMPOSSIBLE any longer to ignore or refute the fact that the paper industry is confronted with a steadily increasing number of critical industry problems which are demanding proper solution. By industry problems, we means problems which are common to every unit in the industry.

To enumerate a few of them, we cite the relationship of all mills, converters and distributors to the government controls, allocations of pulp, and use of directives of paper products and OPA pricing. Already, the suggestion has come from Washington that the pulp allocations be released.

Is this the wise procedure? Should WPB controls be released and OPA pricing controls be retained at this time? What effect industry-wide will result? Who knows?

Should WPB and OPA controls be relaxed gradually or both be retained until both are concurrently released? If so, when and why? Who knows?

Certainly, the effects, which would flow from such critical actions, should be appraised.

Where are the expert research figures and fact findings that will show just what the right answers to these critical problems are?

The industry should have them in order to insure intelligent industry operations.

Tied right into this problem is the collateral one of the tremendous lack of balance between demand and supply situation. While the industry has been operating under the government controls for the past four years, a huge domestic demand for postwar paper products has been accumulating.

And, as the United States paper industry is the largest and most efficient paper producer in the world today, the world's huge, pent-up demand for such products will also turn to this country for satisfaction. Are we prepared for it?

For in the world today, the paper industry in only three areas has come through the war with its producing processes intact. They are the United States, Canada, and Sweden. Their combined production amounts to 25,525,000 tons.

In 1937, the world's production was 31,863,000 tons. Since then, the world has become acutely paper conscious. In every country on earth, a decided impetus has developed for more news, knowledge, industry science and art, all of which require more paper products to effectuate.

In one country alone, the increased consumption of paper is well worth watching. Russia with 183,000,000 people, who in 1937 consumed only twelve pounds per capita, will take its place among those forward nations in the world whose per capita consumption exceeded forty pounds yearly in 1937. Russia will take all of Finland's postwar pulp and paper and then be compelled to embark upon a large scale expansion of paper production. And, she has unlimited timber areas to support it. Russia aims to be a greater consumtr of paper than the United States, which consumed three hundred pounds of paper per capita in 1941. Russia is the potential producer and consumer country of the future. Now, all of these factors are *ex parte* facts. That is, they are based on individual study and research.

Our industry must survey the domestic as well as the foreign development of every factor which affects intelligent industry operation.

What is the industry doing to meet these critical demands?

Getting a Second Wind

▶▶▶ ATHLETES AND manual workers realize the need for getting a second wind. In some cases it may come about without noticeable lessening of effort; but, probably in the majority of cases, it results from a brief respite from arduous duties. Once obtained, the individual often is in position to go ahead at an accelerated pace to finish the task at hand.

It is believed that such a thought applies very well to the quorum meeting of the American Pulp and Paper Mill Superintendents Association that was held on June 9, 1945, at Hotel Commodore, New York City. The wartime ban on national conventions made it impossible for the superintendents to meet in their usual manner—coming together in years past from the Atlantic to the Pacific, from the Canadian border to the Gulf of Mexico, also from Canada and other countries. Therefore, a quorum meeting was necessary to conduct such business of the Association as was imminent.

Rather than working a hardship on the Association, the meeting may prove to be unusually beneficial.

It has given everyone in the Association—officers and members alike—an opportunity to take account of what the Association has done in the past, what it is doing now, and what plans should be made for the future.

Everyone knows that no organization can remain static for long. It must continue to make progress or it will die of dry rot.

During its twenty-six years of existence, the Superintendents Association has made remarkable progress. The present Association is the result of an idea, nurtured with splendid leadership, that has brought about closer relationship between management of men, an idea that has stimulated the growth of a larger and better papermaking industry.

The future of the papermaking industry to a degree will be dependent upon the effective working of plans that have been made or are now being crystallized in the minds of the leaders of this Association. Some of these plans are far-reaching. May their execution fall upon men with the energy and the vision to see them through. It is believed that they will because, as Elbert Hubbard has written, "Responsibilities gravitate to the person who can shoulder them, and power flows to the man who knows how."

The Dictators of Our Future

▶▶▶ THE ENTIRE WORLD is vitally concerned with the ideals and ambitions, the degree of sincerity and power, of our rulers—because upon them (supposedly) rests the peace and prosperity of all nations in the years to come. What Messrs. Stalin, Molotov, Churchill, Eden, Truman, Hopkins, Stettinius, Chiang-Kaishek (not to speak of those who rule other nations, or they who represent delegated powers of the world at such Conferences as that recently closed in San Francisco) think and do is of the utmost importance to everyone now living.

But *are* we? Let's examine that premise to see whether it be true or false. In so doing, I'll flash back to a very ordinary business project now currently being undertaken by a colleague of mine.

This chap, Mitchell Moon by name, is preparing a manual of general instruction, tables of weights and strengths, and other data for the Wire Rope and Strand Manufacturer's Association. His final work is to represent the concerted opinion of American wire rope manufacturers regarding the various types and constructions of wire ropes made here in the United States; to discuss the relative merits of preformed wire rope versus non-preformed; and to make definite recommendations which may be followed universally. This book, however, will not be used by the manufacturers of wire rope in the United States. It is to be the wire rope industry's *export* or foreign-trade book. As such it will be translated into Spanish, Portuguese, and other languages, and distributed abroad when domestic demands are smaller and they have an opportunity to seek export trade.

As the copy began to take form for this manual, it became apparent that this book not only be translated into the several so-called foreign languages *—but also into English.*

Why "English?" you ask. For the very good reason that there is a pronounced difference between Yankee American and English. And also because the majority of the industrialists who buy wire rope in such places as Burma, Singapore, India, South Africa, Australia, New Zealand, Guianas, and in many other places where some other language dominates —those buyers are schooled in English, *not* American. Our United States born "plow steel" is "plough steel" to them. They have idioms of their own, and frequently would not understand American idioms . . . So, if the wire rope makers of United States are to implement themselves with sales literature for the export trade, they should have it translated into English as well as Spanish, Chinese, and what-not.

And now back to the San Francisco Conference . . . Perhaps you saw that amusing photograph which received wide newspaper circulation—the one of Molotov before the microphone addressing the S. F. Conference, with Anthony Eden on a bench above him, chin in hand, manifestly wishing he was back in Lon'on . . . Because Molotov was speaking Russian (being unable either to speak, write or read English) and Eden in a similar fix on the vice-versa side . . . The picture was amusing, but the serious lack of a universal diplomatic language is not.

What finally comes out of the San Francisco Conference (or any other international meeting) is not so much what is in the minds of Eden, Churchill, Truman, Stalin, et al—as it is in the hands of a small bunch of *translators.*

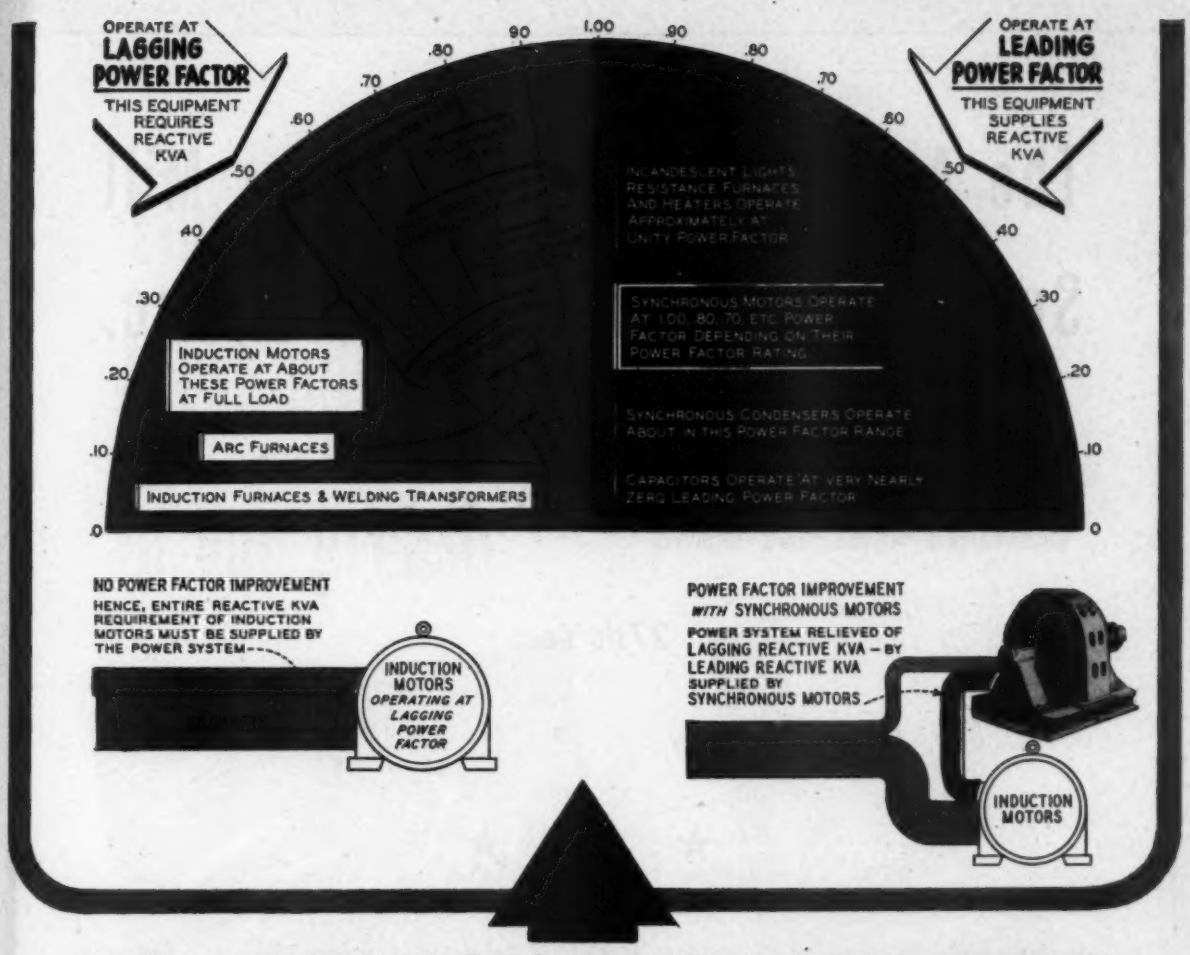
Until very recently we here in the United States have been kicking like a bay steer because Russia was actively violating the Yalta agreement. And we continued to revile Russia—until someone was bright enough to go to the Library of Congress in Washington and look up the Yalta Agreement, then put the English translation opposite the Russian translation. With the aid of a scholarly Russian linguist who had only the most superficial knowledge of the Yalta affair, it came out that the Russian translation of that Agreement meant several things which the English did not—and that what the Russians had been doing all this time was to follow out, to the letter, the Agreement—as they saw it and as it had been translated to them.

Translators are not vicious people. They do their work earnestly and sincerely. They give forth of their ability to the last ounce. But the Russian alphabet has neither character "w" nor "c." Our English alphabet has no characters to represent some of those they use. The Chinese alphabet contains characters which mean an entire word, and even an entire thought.

Far-sighted people, years ago, started to promote a universal language which they called Esperanto. The scheme not exactly nowhere. It probably will stay there. But this serious Yalta-Russian mistake, the idea of Eden going wool-gathering while Molotov addressed a conference which could vastly effect his nation, the idea that Yankee American should certainly be translated into English—should give pause to American manufacturers who are now planning to extend their export trade after the war.

Be careful who translates your sales literature. A power shovel might easily become a small spade. A pneumatic jack hammer might be thought of as a tool to pound jack-stones into the pavement. Preformed wire rope, which has no "internal torsional stress," might become a strand of wires which had no bellyache—or one which is not constipated. Poor translation of your own basic industrial language can make your product ludicrous in the eyes of your foreign prospect. It can cost you sales. It can make your venture into export trade a costly one.

I can offer no panacea for translation ills. If I could, I would certainly give it to the world's political big-wigs and be of lasting benefit to the future peace. For the industrial manufacturers, however, it would seem the better part of judgment to assign their American literature to schooled, linguistic *buyers,* or manufacturers agents, located in the country they wish to invade—men who are on the ground and know their products as well as their markets, and have *them* do the translating. To depend upon American translators, many of whom are unfamiliar with your product or its difference from your competitors products, can be dangerous and costly.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INDUCTION MOTORS OPERATING AT LAGGING POWER FACTOR
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INDUCTION MOTORS

HOW SYNCHRONOUS MOTORS HELP REDUCE YOUR ELECTRIC POWER COSTS

By Keeping "Deadhead" Current Off Your Power System!

YOUR power supply has to provide two kinds of power: useful kilowatts that do work, and "deadhead" reactive kva needed for magnetizing induction motors and other inductive a-c equipment. Both must be paid for, though one's a *dead horse.*

Synchronous motors can help lick this problem. Because in addition to driving their mechanical loads efficiently and economically, they can also furnish *extra magnetizing kva to take care of inductive load requirements.*

This takes some reactive load off the power supply, which then has greater capacity for delivering *useful* kilowatts to your motors. Result: a higher power factor . . . which under many power rates assures substantial savings in power cost . . . and better motor performance in your plant because of improved voltage regulation!

Write today for "ABC of POWER FACTOR"

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220 E. 42nd Street,
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A wide range of temperature application

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One outstanding advantage of Stanobar Grease is that it can be applied by grease gun on a wide range of anti-friction bearing lubrication jobs. That's because Stanobar Grease has a smooth, non-fibrous, texture which is unusual in a grease that is suitable for both high and low temperature service.

There are other reasons—explained in the booklet offered—why Stanobar Grease can help you eliminate grease lubricating problems. Send for a copy or ask a Standard Oil Lubrication Engineer about the application of Stanobar Grease on your particular job. Write Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois, for the Engineer nearest you.

Send for this booklet

—it tells why Stanobar Grease gives the advantages listed above wherever it can be applied to your anti-friction bearing lubricating job. Ask your Standard Oil Industrial Service Representative for a copy of the book, or write or call the nearest Standard Oil Company (Indiana) office.

Buy more War Bonds

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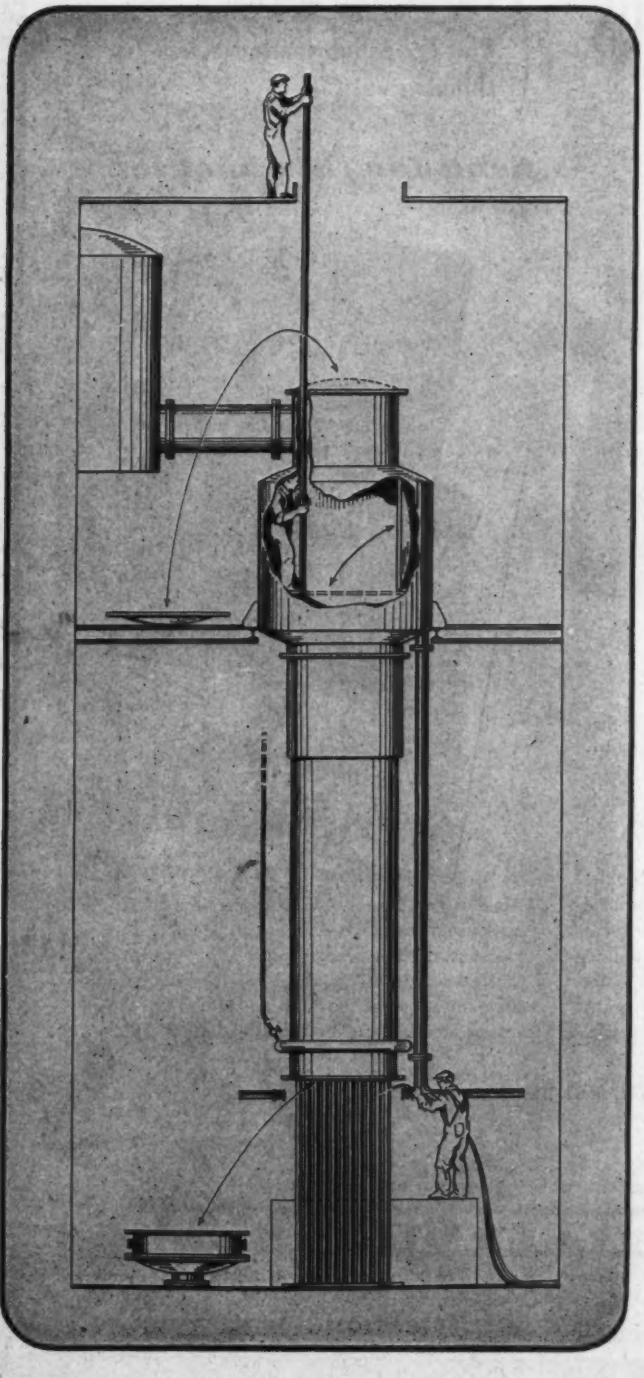


CONKEY

LONG TUBE

FILM TYPE

EVAPORATORS

Simplicity of design for dependable operation and accessibility make Conkey Long Tube Film Type Evaporators "Tops in Equipment" in pulp mills.

The heating elements or tube bundles of Conkey Long Tube Film Type Evaporators are projected vertically into the vapor head and liquor feed box. A tangential feed inlet provides for a free flow of feed liquor with uniform distribution to the heating surface. Control of climbing film is secured through the proper proportioning of the length to the diameter of the tubes.

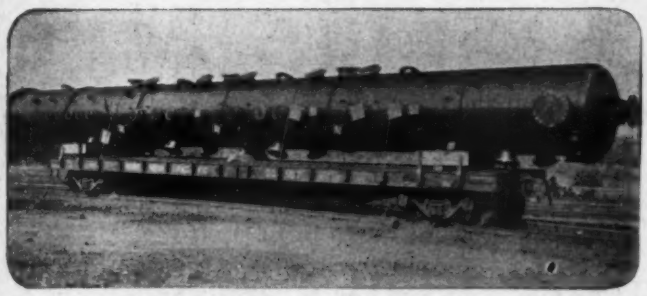
Access to top tube sheet for removal of a tube or tubes is provided by removing the flanged cover on the dome surmounting vapor head and swinging back the deflector baffle. A similar cover plate on bottom liquor box provides access to lower tube plates without the necessity of breaking piping connections. Replacement of tube bundle is readily made by removing bottom liquor box and dropping tube bundle as shown.

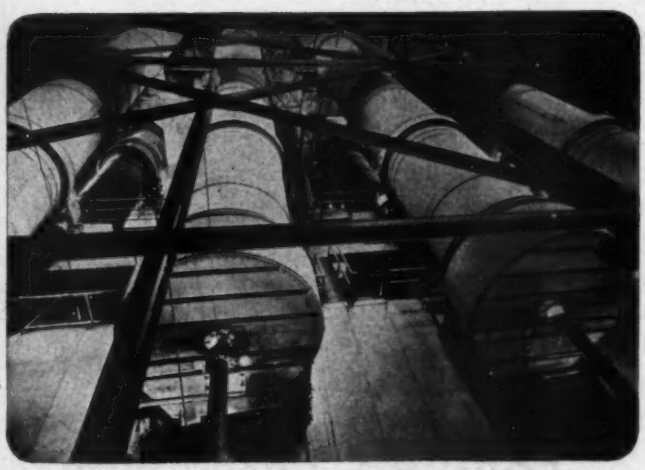
Conkey Long Tube Film Type Evaporators are designed by engineers experienced in pulp mill processing for dependable performance, as well as for low maintenance and supervision costs.

EQUIPMENT!

PLATE FABRICATION

IN ALL STEELS, ALLOYS, AND OTHER METALS





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The Plate and Welding Division offers complete facilities and wide experience in the production of hundreds of items such as accumulators, autoclaves, air receivers, bins, car tanks, boiler drums, condensers, columns, crystallizers, dissolvers, digesters, heat exchangers, kilns, mixing and blending tanks, fractionating towers, stacks, storage tanks of all sorts and sizes, stills, scrubbers, large-diameter welded or riveted pipe, and all types of pressure vessels. The Division has complete X-ray facilities, heat-treating and stress-relieving furnaces and is in position to build and test all classes of welded vessels to API-ASME, ASME and other codes.

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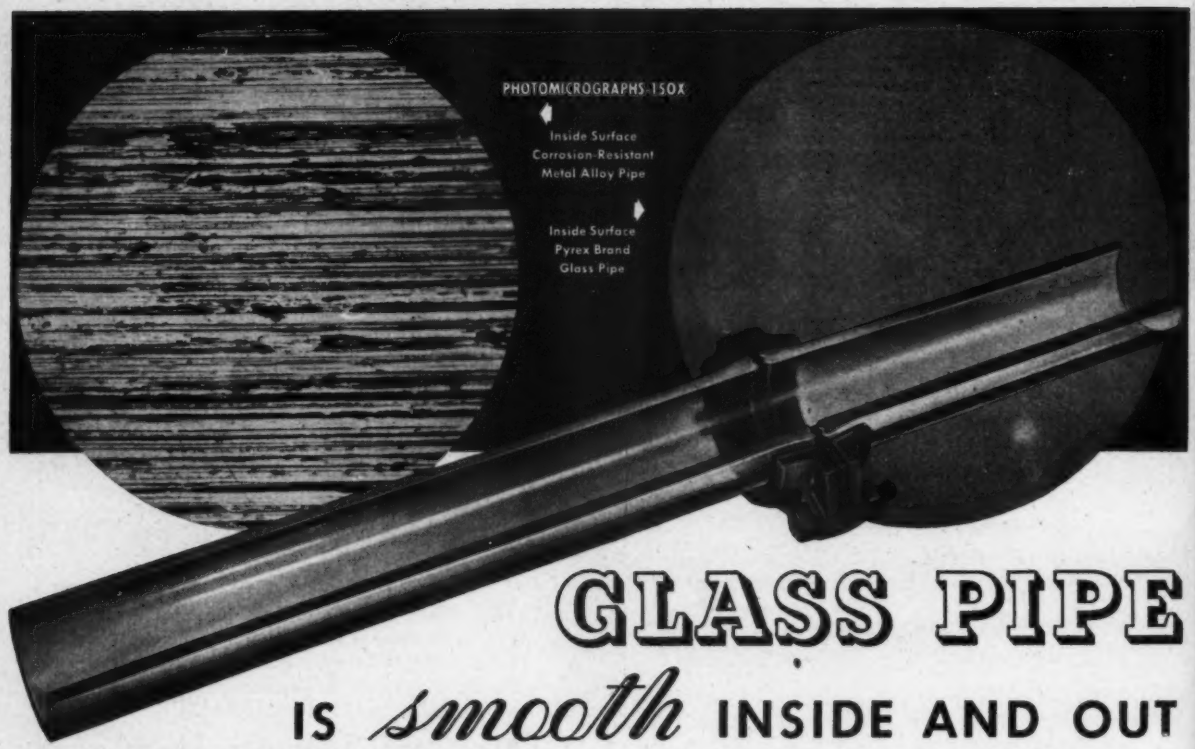

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IS *smooth* INSIDE AND OUT

COMPARE the unretouched photomicrographs above. They tell the story . . . the important story . . . of the relative surface smoothness of PYREX Pipe as compared to corrosion resistant metal alloy pipe. And, PYREX Brand Glass Pipe stays smooth.

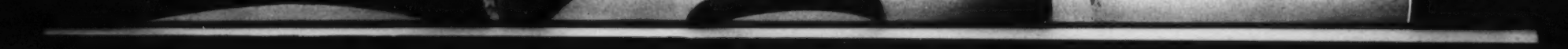
The hard, smooth surface of PYREX Pipe resists scratching and abrasion. Its high chemical resistance minimizes or eliminates pitting and scaling due to corrosion.

In your pipe lines, this smoothness is a feature that insures a smooth, even product flow throughout the service life of the pipe. Pipe line friction and turbulence are lessened. There are no rough edges or deep crevices to catch and hold dirt or scale. Combined with the thermal resistance of PYREX Brand Glass, it makes cleaning easier and surer. Pipe lines can be flushed visibly clean in a few minutes time with steam or hot water.

In addition, because of the transparency of PYREX Pipe, you can easily check for these conditions at any time or at any stage of processing.

For more information on any of these features of PYREX Pipe or on its application in your processing operations, write today to the Industrial Sales Department PI-7.

CORNING GLASS WORKS
CORNING, NEW YORK



— there is a "Hooperwood-Engineered" Dryer Felt to answer each specific requirement.

Because no single type of Dryer Felt will suit the needs of all mills — or even all positions on the same machine — WM. E. HOOPER & SONS COMPANY has produced several distinct types of Cotton and Asbestos Felts.

Therefore, for instance, if it is a rugged, heavy felt you need for fine finish in normal production . . . or a lightweight, extra-porous felt for faster drying . . . or an Asbestos felt to withstand the advanced temperatures in high-speed production of Kraft and other heavy papers — HOOPERWOOD "Canvas Engineering" has the answer to your problem.

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

Mills: WOODBERRY, BALTIMORE, MD.

HOOPERWOOD DRYER FELTS

COTTON AND ASBESTOS

With Victory ~ planes and ships returning home—every American industry that has had a part in war production will have the deep satisfaction of having done a stupendous job well. We, who have turned our facilities into the making of essential war matériel, have learned lessons—have gained new and valuable ideas that will enable us to give greater services in the designing and building advanced finishing machinery for the great paper industry.

B. F. PERKINS & SON, Inc.
ENGINEERS AND MANUFACTURERS
HOLYOKE, MASS.

PAPER BOARD SIZING

IS NO PROBLEM!

TRY THE NEW—

KelginLV

You'll be surprised at the splendid results and the remarkable economy of sizing paper board with KELGIN LV—for wax coatings and gloss ink printing.

KELGIN LV dissolves quickly in cold or hot water and is adaptable to water box application on the calender stacks. It has other money-saving applications, too. It may be just the sizing material you've been looking for.

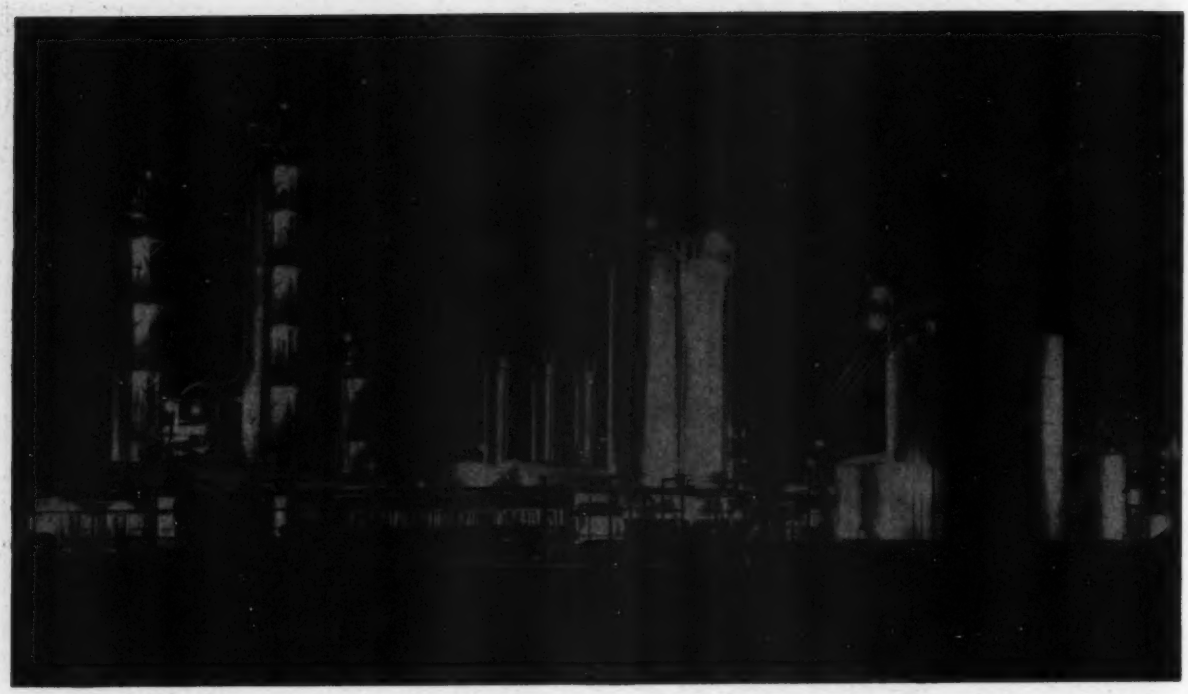
Worth trying—for it's very inexpensive. Our Technical Department will give you full cooperation in your application of KELGIN LV.

KELCO COMPANY

75 E. Wacker Drive
CHICAGO-1

31 Nassau Street
NEW YORK-5

530 W. Sixth Street
LOS ANGELES-14



Birthplace OF THE DRUMS OF WAR

Bowser XACTO Meters Speed Barrel-filling At Shell's Wood River Refinery

Important factor in the vital task of supplying our machines of war with gasoline and oil is Shell's Wood River Refinery . . . scene of production triumphs and the source of advanced refinery techniques.

Making lubricants and high octane fuel is an exacting job . . . demanding absolute control and clocklike precision.

And that's a perfect setting for the batteries of Bowser Meters that fill the barrels and drums in Shell's compounding and shipping department.

For, here, the range of requirements call for all the features for which Bowser Barreling Meters are famous. These include: extreme accuracy, unique temperature compensation for correcting measurement, a simple and effective predetermining mechanism—plus the speed and efficiency that is helping to keep Shell's "drums of war" rolling.

* * *

In the paper industry other phases of Bowser liquid control are equally important. For instance, virtually all pulp and paper mills in the United States and Canada have installed Bowser Lubrication Systems for lubricating dryers, calender stacks, Jordans, hydrafiners and turbines.

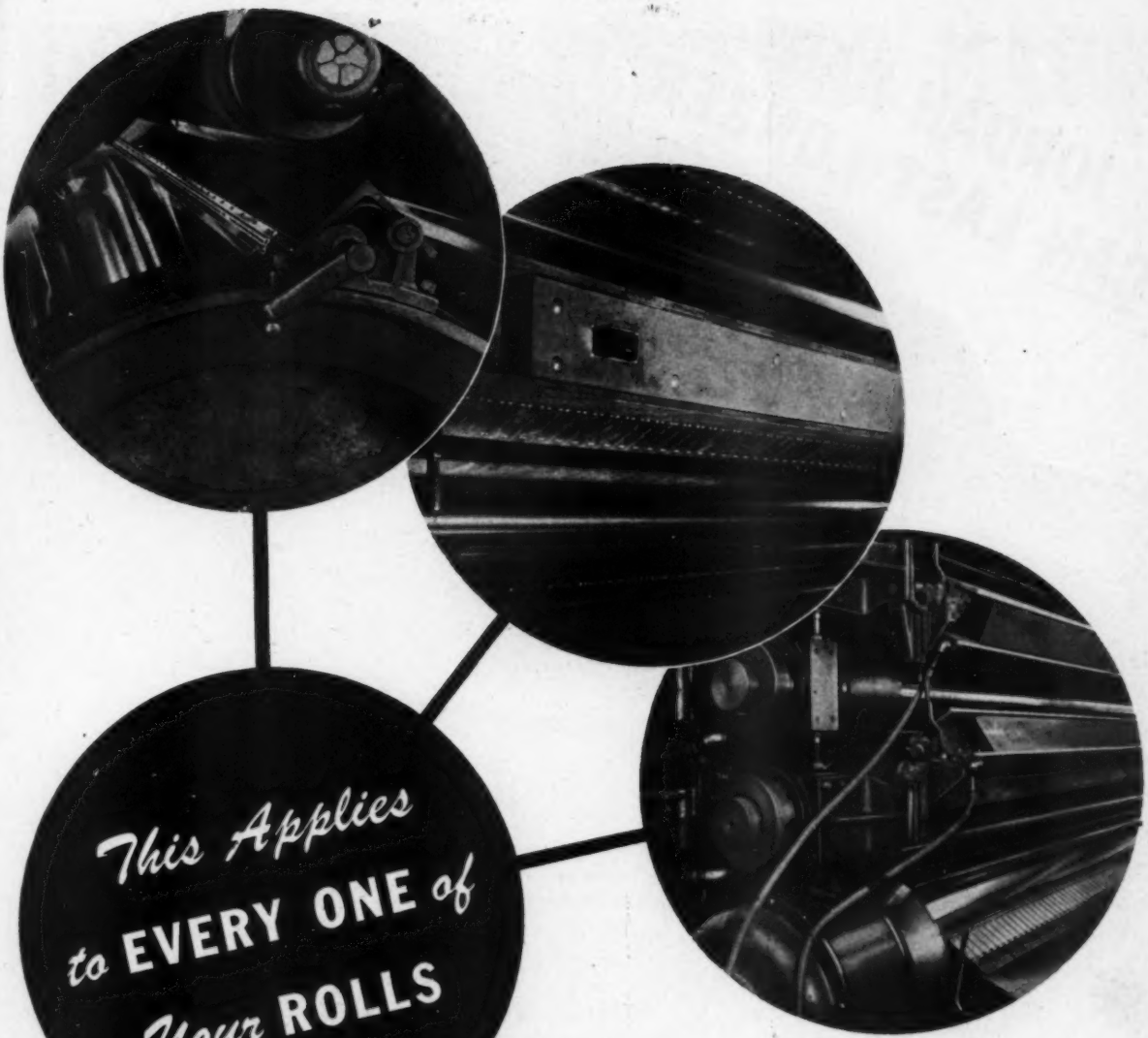
Also widely used are smaller Bowser units, such as force-feed lubricators, oil filters for steam engines, flow indicating devices, etc. For money-saving facts write to BOWSER, INC., Dept. 16-G, Fort Wayne 2, Ind.

BOWSER

SINCE 1885

Not only has Bowser war production earned the Army-Navy E . . . Bowser equipment has helped earn it for scores of other companies.

THE NAME THAT MEANS EXACT CONTROL OF LIQUIDS



Press rolls, breast rolls, wire rolls, dryers, calenders, super-calenders — they all do better work and keep on doing it with less attention when they're equipped with correctly engineered and constructed doctors — VICKERY DOCTORS.

Applied to any single roll this may seem like a little thing, but collectively, it makes a whale of a difference in your ability to make good paper and the most of it per day at lowest cost per ton.

BIRD MACHINE COMPANY · SOUTH WALPOLE, MASSACHUSETTS

VICKERY DOCTORS

JORDAN BARS CAN LAST LONGER

Jordan plug partially filled with *Monel Bars* and plug bands. Standard on many types of jordans, and safely used in combination with bars of other materials, *Monel plug bands* assure anchorage unendangered by corrosion and corrosion-fatigue. *Photo courtesy of Shartle Bros., Middletown, Ohio.*

. . . and cost less!

Frequent replacement of jordan fillings is not only costly . . . but *unnecessary*. Paper and paper board mills have proof . . . in the form of actual *performance records*.

In an *Appleton* jordan, for example, Monel plug bars gave 13 years' service refining bleached sulfite stock for bond, ledger and writing papers.

Monel plug and shell bars in a *Majestic* jordan served six years and nine months on raw stock for coated papers. Monel plug bars and shell bars in two jordans refining sulfite and sulfate stocks for bag and wrapping paper, as well as tissue and M.G. waxing paper, are still in use *after 10 years of service.*

Nor are these isolated cases. Other mills report similar experiences, and some have obtained even longer service from Monel jordan fillings.

Monel, in addition to its inherent ability to withstand corrosion, is extremely tough and possesses high impact resistance. Jordan fillings retain smooth working surfaces. They do not feather, and the edges do not chip. The result is an improved refining action and more thorough hydration.

Information on Monel fillings may be secured from your regular supplier or from any of the jordan manufacturers. Further data about the refining characteristics of Monel jordan bars, including mechanical properties and hardness specifications, as well as performance and cost records in typical installations, are contained in the folder, *Monel Jordan Bars*. Write us for your copy.

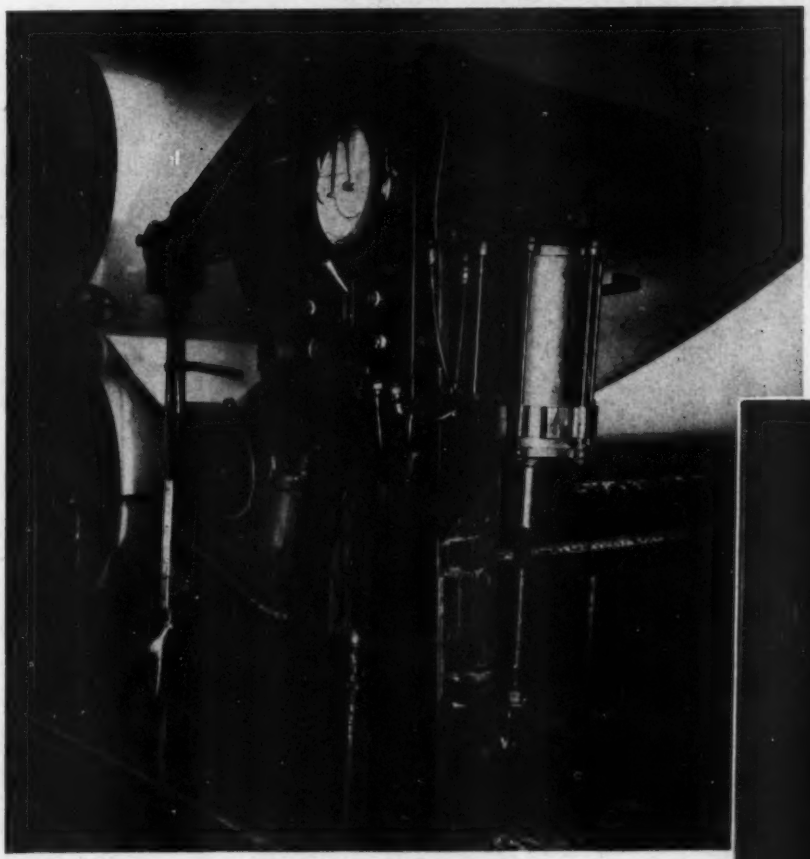
THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York 5, N. Y.

MONEL

NICKEL INCO TRADE MARK ALLOYS

MONEL • "K" MONEL • "S" MONEL • "R" MONEL
"KR" MONEL • INCONEL • "Z" NICKEL • NICKEL
Sheet . . Strip . . Rod . . Tubing . . Wire . . Castings . . Welding Rods (Gas & Electric)

BIGGEST ADVANCE EVER MADE
in Applying Roll Pressure!



Typical installation of Foxboro Pneumatic Loading on wet press in Canadian mill. It maintains calibrated pressure at each end of roll, and furnishes continuous records.

Foxboro Pneumatic Loading gives calibrated "cushioned" pressure with fingertip control!

With a simple twist of two knobs on an instrument, you can exactly adjust and equalize the pressure at both ends of any pressure roll equipped with Foxboro Pneumatic Loading!

What's more, this exact pressure is then automatically and continuously maintained by the smooth "cushioned" action of air in pressure cylinders. There's no variation across the sheet . . . no bouncing rolls . . . no "washboarding" of the paper. And it takes but a flip of a lever to unload both ends *instantly!*

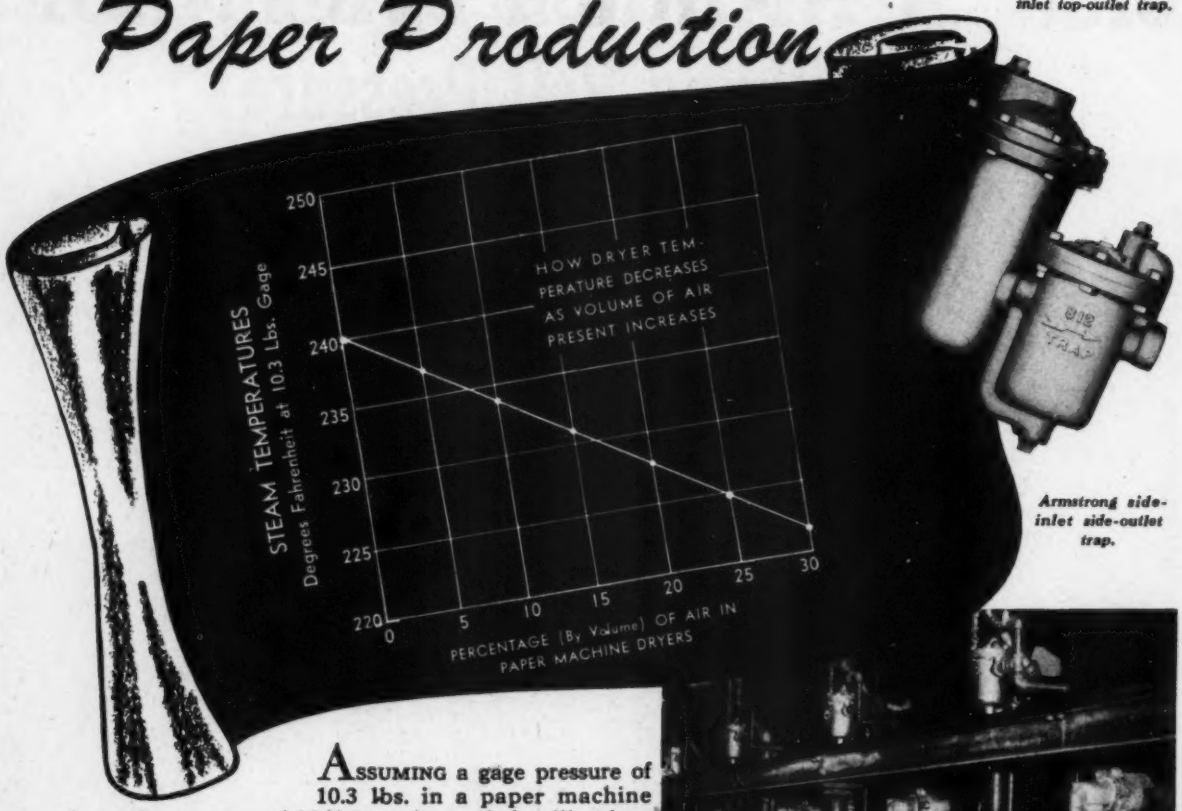
That is just a quick outline of the Foxboro development which is improving paper production wherever loaded rolls are employed. On calenders, Foxboro Pneumatic Loading Systems maintain uniform caliper, lengthwise and across the sheet. On wet presses, they enable *maximum* moisture extraction through more-exact adjustability . . . and *uniform* extraction across the sheet, through independent adjustment of each roll-end.

Get full details of this important advance in roll loading. Write for Bulletin B-306. **The Foxboro Company, 158 Neponset Avenue, Foxboro, Mass., U. S. A.** Also Montreal, Canada. Branches in principal cities.

PNEUMATIC LOADING BY FOXBORO

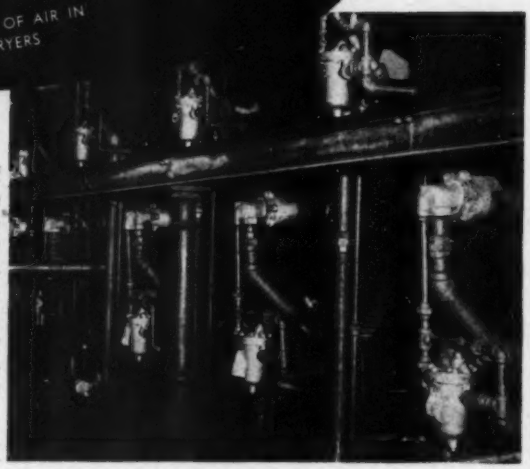
REG. U. S. PAT. OFF.

. . . how air in dryers reduces *Paper Production*



Armstrong bottom-inlet top-outlet trap.

Armstrong side-inlet side-outlet trap.



ASSUMING a gage pressure of 10.3 lbs. in a paper machine dryer, the presence of 20% by volume of air will reduce the steam temperature to 228° F., which is *12.1° below true steam temperature.* Higher percentages of air reduce temperatures correspondingly. The effect on paper production of sub-normal dryer temperatures is obvious.

Accumulation of an excessive amount of air in a dryer is generally the result of inadequate drainage of condensate which permits the syphon pipe to become water sealed thereby closing it off to the passage of air.

Armstrong Inverted Bucket Steam Traps designed specially for paper mill service eliminate this difficulty and assure you maximum temperatures by:

1. Drainage of condensate as fast as it collects, thus permitting free passage of air from the dryer.
2. Automatic venting of *all* the air drawn from the drying cylinder.

For a comprehensive, educational and easy-to-read study of this subject write for a copy of "OBSERVATIONS ON DRYER DRAINAGE SYSTEMS" by Paul L. Ulrich.

CHECK YOUR DRYER TEMPERATURES! If below true steam temperature, your drainage system is inadequate. For complete details, write today.

HIGHLIGHTS
Armstrong Drainage

1. Drains condensate as fast as it accumulates.
2. High Air venting capacity.
3. No steam waste.
4. Low maintenance.
5. Maintains uniform temperatures, uniform drying.
6. Quickly responsive to load changes.
7. Permits operation of groups of dryers at different temperatures.
8. Reasonable first cost — an investment that pays high returns.

ARMSTRONG MACHINE WORKS
816 Hoffman Street, Three Rivers, Mich.

ARMSTRONG *Inverted Bucket* STEAM TRAPS

"Tomorrow is *another* day"

Because, for almost a century, Powell Engineering has been anticipating the flow control requirements of products and processes still in the laboratory stage, Powell was ready to meet—and has met—every new demand imposed by war. Today we can justifiably say "there's a Powell Valve for every *known* requirement of industry."

But "tomorrow is another day" and it will bring new problems in flow control. Powell, as always, will be ready to solve them.

The Wm. Powell Co.

Dependable Valves Since 1846

Cincinnati 22, Ohio

1793

Fig. 1793—125-pound Iron Body Bronze Mounted Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke, bronze seats, and taper wedge solid disc. Available with taper wedge double disc—Fig. 1444.

500

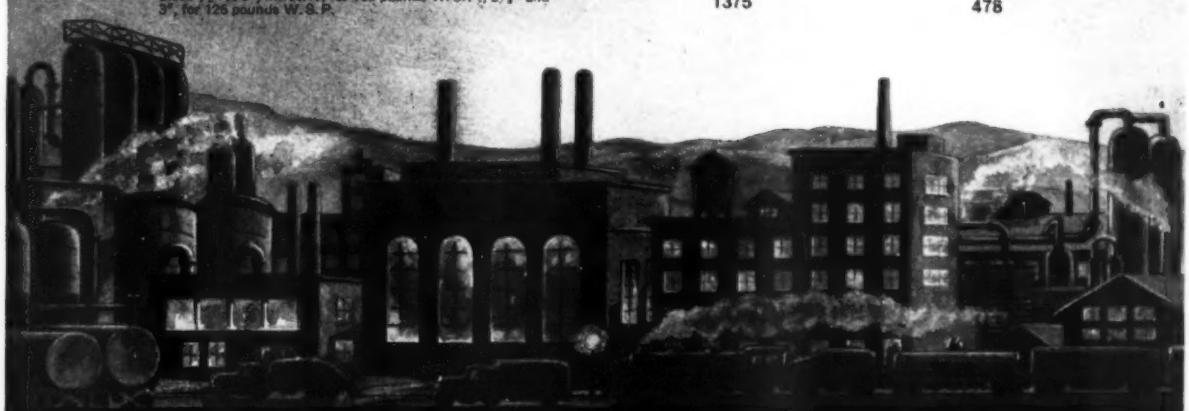
Fig. 500—125-pound Bronze Gate Valve, with screwed ends, inside screw rising stem, screwed bonnet and either taper wedge solid or double disc.

1375

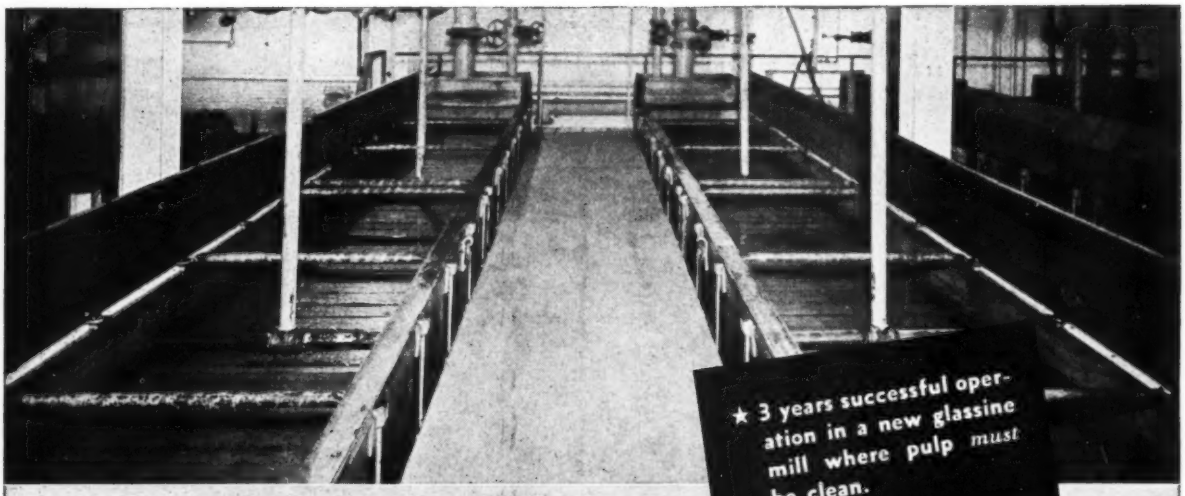
Fig. 1375—200-pound Bronze Gate Valve, with screwed ends, inside screw rising stem, union bonnet and wear-resisting nickel bronze seat rings and disc.

478

Fig. 478—Iron Body Bronze Mounted "Pilot" Gate Valve with screwed ends, outside screw rising stem, bolted yoke and taper wedge solid disc. Sizes ½" to 2", inclusive, for 150 pounds W. S. P.; 2½" and 3", for 125 pounds W. S. P.



POWELL VALVES



A NEW FLAT SCREEN by VALLEY

★ 3 years successful operation in a new glassine mill where pulp *must* be clean.

★ Noiseless diaphragm action.

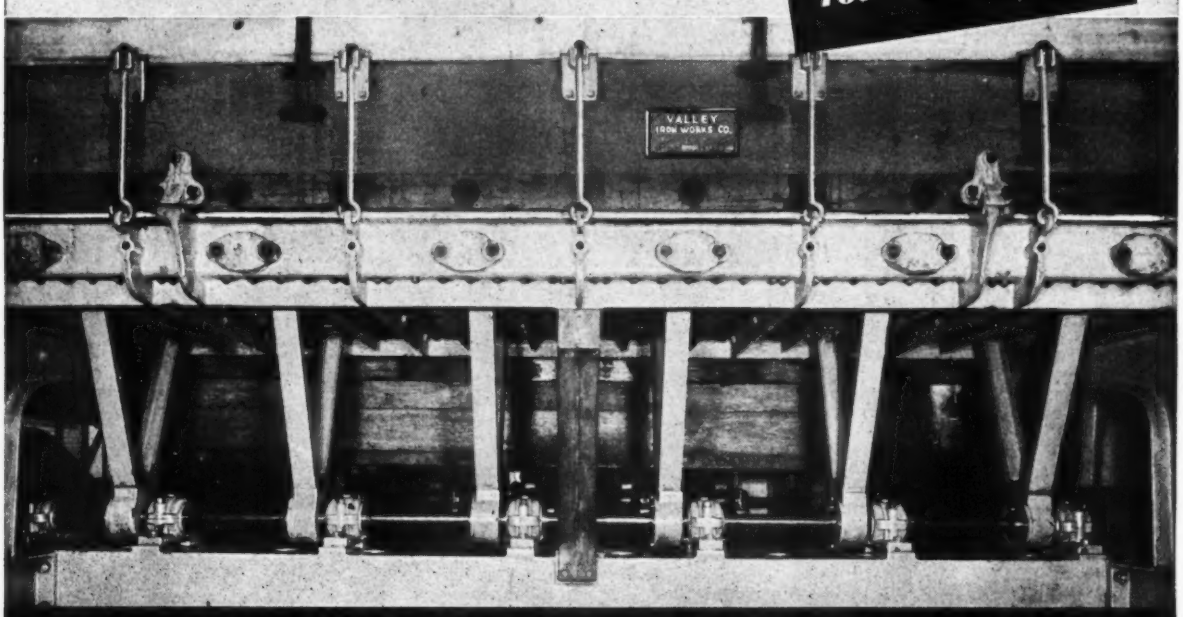
★ Diaphragm throw can be changed in 5 minutes.

★ Maintenance over a 3-year period has been nil.

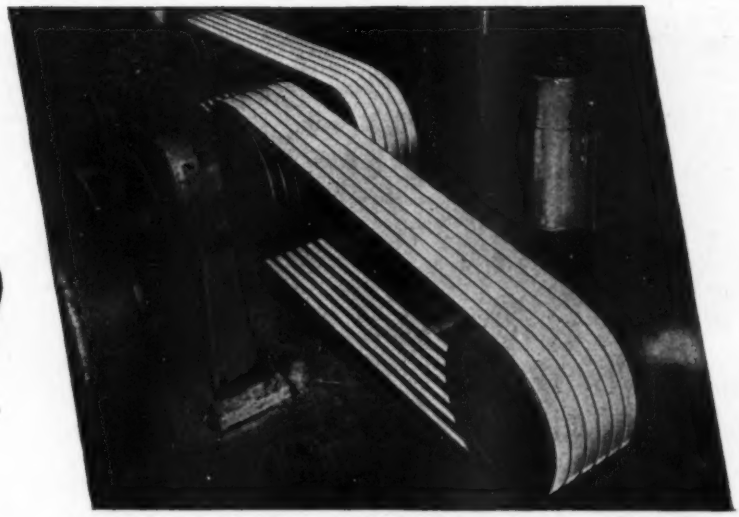
★ Screens are lubricated twice a year.

★ Note clean lines — modern design.

the Flat Screen for YOUR Mill



VALLEY IRON WORKS CO • APPLETON, WISCONSIN



HERE IS A FACT WORTH KNOWING

GATES *Standard* VULCO ROPES

—now made of *Synthetic Rubber* are

OUTWEARING even *pre-war* belts of *NATURAL RUBBER!*

NO ONE before the war had ever built a V-Belt that could stand the service now daily delivered by Gates V-Belts on army tanks, tractors and self-propelled big guns. Gates developed these greatly superior V-Belts through intensified, specialized research—and Gates is building these belts entirely of synthetic rubber.

✔ **The importance of this fact to industrial V-Belt users is this:**

Every improvement developed by Gates for these Army V-Belts has also been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.

It is only rarely, of course, that improvements developed primarily for army combat use can be passed on immediately to the general user—but there are very good reasons why Gates has not been called upon to withhold these important V-Belt improvements from Industrial V-Belt users.

Efficient production in our nation's industrial plants is a prime essential to our winning of the war—and better V-Belts than ever before have been urgently needed to keep machines going on the forced-draft, war production schedules that have had to be maintained *24 hours a day!*

That is why Gates has been able to embody in the standard Gates Vulco Rope every V-Belt improvement which Gates specialized research has developed for use on the Army's motorized equipment—and that is why you are finding that your standard Gates synthetic-rubber Vulco Ropes are today giving you better service than any V-Belts that were built before the war.

Gates

THE MARK OF SPECIALIZED RESEARCH

THE GATES RUBBER COMPANY

Engineering Offices and Jobber Stocks in All Large Industrial Centers

487

GATES VULCO ROPE DRIVES

CHICAGO 6, ILL. 549 West Washington. NEW YORK CITY 3, 215-219 Fourth Avenue ATLANTA 3, GA., 738 C. & S. National Bank Bldg.
LOS ANGELES 21, CAL., 2240 E. Washington Blvd. DENVER 17, COLO., 999 S. Broadway DETROIT 4, MICH., 8563 Grand River Ave.
PORTLAND 9, ORE., 333 N.W. 5th Ave. DALLAS 2, TEXAS, 1710 N. Market St. SAN FRANCISCO 3, CAL. 1090 Bryant St.

Bigger and Better Suction Box Covers — with Ryertex

26 foot Ryertex cover will speed news print production

This huge Ryertex laminated plastic suction box cover, with its more than 2,400 holes, was recently furnished to a Canadian news print mill. The reasons for selecting Ryertex are many: Ryertex is a much harder, stronger, and more uniform material than wood. It won't split, crack, splinter or warp. It possesses unique bearing properties with low coefficient of friction when water lubricated. This means slow, even wear, longer life, and greater operating efficiency. These qualities have been proven through performance in hundreds of other mill installations.

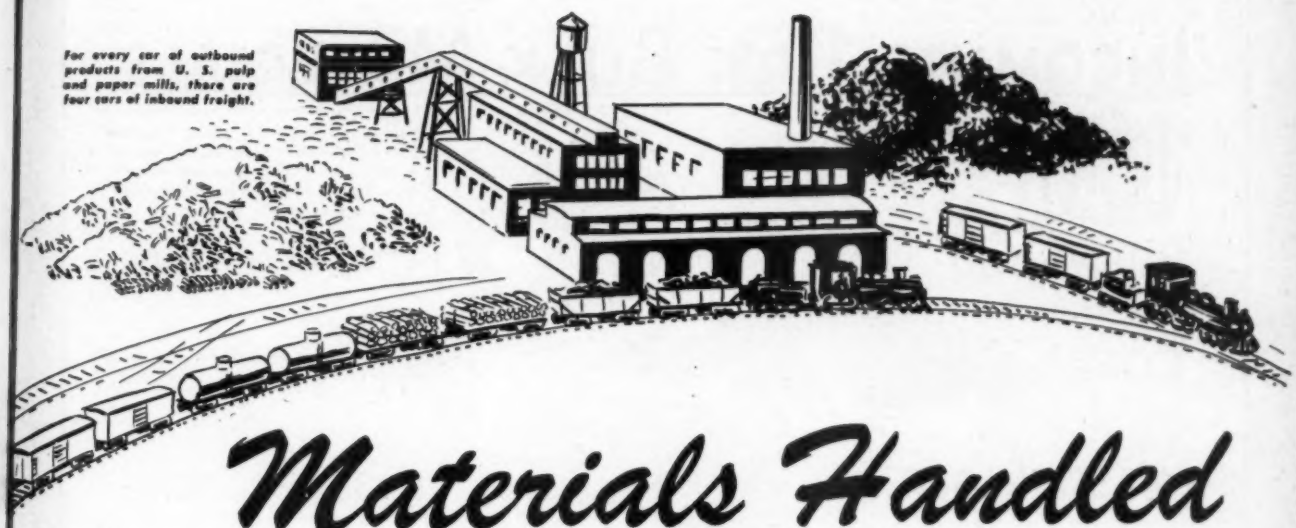
Ryertex is also particularly well suited for bearing applications. Installations are made on the basis that they more than pay for themselves through economies of lubricant, power expended, longer life and ease of maintenance. Ryertex lends itself to any type of lubricant, oil, grease, and especially water. It is adaptable to any size or shape, and is ideally suited for every bearing application from log hauls to calender roll necks.

Investigate. Let our engineers show you how to apply Ryertex to your particular suction cover and bearing problems. Write for further information on any phase of Ryertex.

JOSEPH T. RYERSON & SON, INC.

Ryertex Division, Chicago and New York

RYERTEX BEARINGS



Materials Handled

in the Pulp and Paper Industry

HARRY E. WESTON

▸▸▸ A RELATIVELY HIGH standard of living is enjoyed by the people of these United States. Some may ask to what do we, who live in this great country, owe that blessing which all nations strive to gain? Many things contribute to our modern way of living, but outranking most of them are (1) our rich endowment of natural resources, and (2) our development of the idea of mass activities.

One of the most important contributions to the progress of this country has been the development of fast, efficient, and cheap transportation. What would the United States be like today if people and freight still had to move by river or lake boat, canal boat or ox team?

The development of equipment for the bulk handling of materials has done for American industry just what advances in transportation have done for the movement of people and freight. It has permitted the idea of mass production to be put to work, thus increasing our standard of living.

It is, of course, a fact that neither our modern systems of transportation nor our methods of materials handling developed without travail. There were people who thought that such developments were impossible or undesirable. They were not for the public good; they were works of the devil—or something equally as bad.

Some of this resistance actually may have been the result of poor promotion on the part of the developers themselves. For example: Not so many years ago, materials handling equipment was known as labor savings equipment. Wages were small in those days and labor was plentiful. Therefore, it was but natural for labor to resist any development that seemed destined to put men out of work.

However, progress cannot be stopped. It can only be delayed.

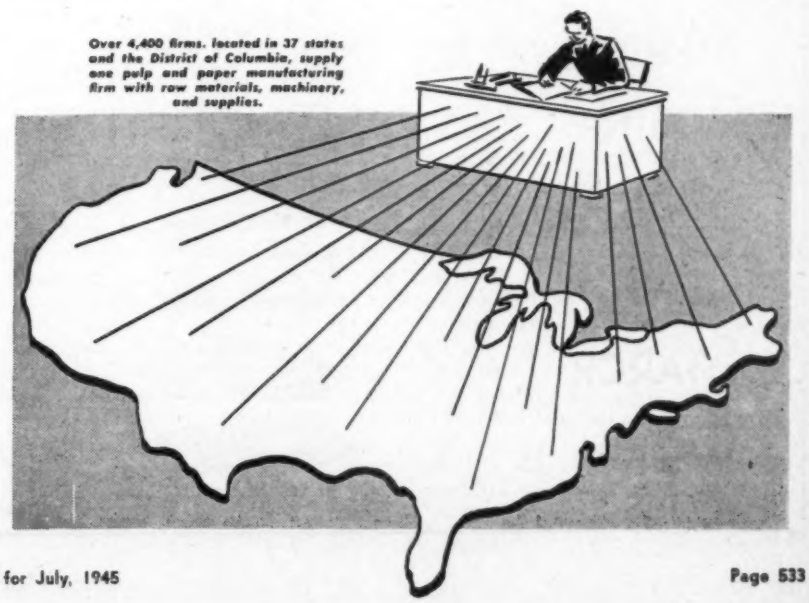
Practices at times may appear static; but they are not. They change as new conditions arise or as new equipment is developed to improve existing conditions.

The first machine-made paper to be produced in the United States was made in August, 1817. This paper was made on a cylinder papermaking machine in a mill, known as the Gilpin Mill, located on the Brandywine, near Wilmington, Delaware. The machine had been developed by Thomas Gilpin, one of two brothers who operated the mill, and who took out a patent for it in December, 1816.

The first fourdrinier papermaking machine installation in the United States was in the mill of Beach, Hommerken & Kearny, Saugerties, New York. This machine, built by Bryan Donkin in England, was put into operation on October 24, 1827.

These two initial machine installations thus became cornerstones of the large industry of today.

According to figures of the American Paper and Pulp Association, the paper and pulp industry in 1944 represented an investment of approxi-


Over 4,400 firms, located in 37 states and the District of Columbia, supply one pulp and paper manufacturing firm with raw materials, machinery, and supplies.

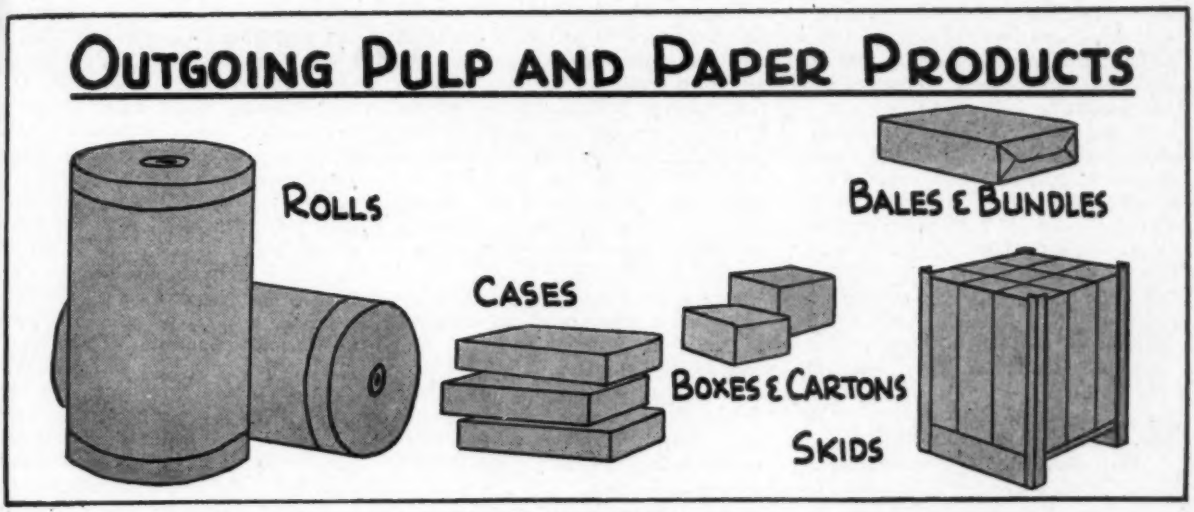
Adapted from paper presented May 10, 1945, before Clark Material Handling Institute (Clark Tructractor Company), Post Tavern, Battle Creek, Michigan.

INCOMING DRY BULK MATERIALS

This wood, cut into 4-foot lengths and piled 4 feet high, would make a pile extending approximately four-fifths the distance around the world at the equator.

PULPWOOD	13,742,958 CORDS
COAL	10,000,000 TONS
WASTE PAPER	5,936,231 TONS
WOOD PULP BALES - ROLLS - LAPS	2,097,073 TONS
STRAW	605,586 TONS
RAGS	460,943 TONS
LIMESTONE	365,000 TONS
LIME	500,000 TONS
SULPHUR	340,000 TONS
SALT CAKE	583,000 TONS
ALUM	143,000 TONS
ROSIN	92,000 TONS
SODA ASH	199,000 TONS
CLAY	530,000 TONS
STARCH	109,000 TONS
CASEIN	11,000 TONS

(Typical Annual Requirements)



U. S. Pulp and Paper Production, 1944: Wood Pulp, 10,108,443 tons; Paper and Paperboard, 17, 182,804 tons.

mately 2.9 billion dollars or about $19,600 for each of its 147,000 employees. The paper production per employee, according to the same authoritative source, was 117 tons in 1944. It was 98 tons in 1939.

The total paper and paperboard production of the United States during 1944 amounted to 17,182,804 tons. Wood pulp production that same year totaled 10,108,443 tons.

Of the 17,182,804 tons of paper and paperboard, 8,220,236 tons were paper, and 8,962,568 tons were paperboard.

The combined tonnage of paper and paperboard for 1944 exceeded that of all other years except 1941. Yet, the paper production for 1944 was over one million tons less than the 1941 production—in fact, the last three years have witnessed a steady increase in paperboard production and a decline in paper production.

The decline in paper production for the most part involved newsprint, book, coarse wrapping, and tissue papers. This decrease was too large to be offset by an increase in production of shipping sack, special industrial and absorbent papers.

The production of this tremendous tonnage of paper and paperboard requires many different items in the form of fibrous and nonfibrous raw materials, fuel, machinery, mill supplies, etc. One representative firm in the industry revealed in 1940 that its needs for raw materials, machinery, and supplies were being filled by over 4,400 firms, and that these firms were scattered over 37 states and the District of Columbia. A traffic authority serving the industry also has stated that an over-all average figure for freight transportation of the paper industry of the United States is four cars of inbound freight to one car of outbound products.

Each mill, whether a comparatively new one or one that has been in operation for many years, presents a diversity of materials handling problems. Almost every conceivable type of mechanical handling equipment is in use somewhere in the industry. The newer mills, of course, have been designed to minimize the manual handling of raw materials, materials in process, and finished products.

Among the fibrous materials used in the production of paper and paperboard are wood pulp, old paper stock, rags, straw, and old rope. According to figures of Bureau of the Census, 11,134,440 tons of wood pulp, 5,936,231 tons of wastepaper, 460,943 tons of rags, 605,586 tons of straw, and 16,347 tons of old rope were consumed in the production of paper and paperboard during 1941. In addition, the same source reveals a consumption also by the industry that same year of 11,049 tons of Manila fiber, 15,878 tons of burlap waste, 4,183 tons of raw cotton, 28,308 tons of raw flax, and 138,082 tons of other fibrous materials.

Domestic production of wood pulp in 1940 aggregated 8,851,740 tons. To produce that pulp, 13,742,958 cords of wood were consumed. Of that quantity, 5,013,478 cords were southern yellow pine; 2,045,519 cords, domestic spruce; 963,195 cords, imported spruce; 2,636,118 cords, domestic hemlock; 152,653 cords, imported hemlock; 489,866 cords, domestic poplar; 108,809 cords, imported poplar; 415,202 cords, domestic jack pine; 62,773 cords, imported jack pine; 388,577 cords, domestic balsam fir; and 83,609 cords, imported balsam fir.

Other woods used included beech, birch, maple, white fir, cottonwood, tamarack, chestnut, Douglas fir, yellow poplar, oak, tupelo (and black gum), red gum, and willow. There also was a considerable quantity of slabs and mill waste not classified as to kinds of wood.

In the early 1900's, it was common practice throughout the New England, Middle Atlantic and Lake States to use river driving, wherever feasible, for transporting pulpwood to the mills. This practice has given way largely to rail and truck transportation.

In the South, it never has been possible to river drive; while on the Pacific Coast, rafting of logs has been quite common.

A transportation consultant to the Forest Products Bureau of the War Production Board reported recently that ninety per cent of the domestic pulpwood used by the pulp mills moves by truck some part of the distance from stump to mill. This wide use of trucks indicates rather definitely the delivery of most of the wood to the mills in comparatively short lengths (four or five feet), thus presenting a much different yard handling problem than when full length logs are delivered.

Wastepaper, rags, and straw commonly are delivered to the mills in bales. A wastepaper bale may weigh anywhere from 500 to 1,500 pounds; a straw bale, about 100 pounds; a bale of old rags, from about 500 to 1,600 pounds.

A considerable quantity of pulp also is delivered to paper mills in the form of bales, laps or rolls. Mills receiving pulp of this kind may make no pulp or may produce only a part of their requirements.

Pulp bales often weigh from 300

to 450 pounds each; rolls (usually soda pulp) about 300 pounds; and individual laps, if not pressed to reduce their moisture content, about 45 to 100 pounds.

A few of the chemical raw materials used by the industry include limestone, sulphur, salt cake, lime, soda ash, alum, rosin, and starch. Each of these materials with the exception of limestone (which is shipped in open cars) is shipped in box cars. Sulphur, salt cake, lime and soda ash usually are shipped in bulk; alum in 100 or 200 lb. bags, in 300-400 lb. barrels, or in bulk in paper-lined cars; rosin in 375 lb. barrels or in 150 lb. bags and starch in 100 to 280 lb. bags or in barrels of from 100 to 240 lb.

Also there are large tonnages of clay, titanium pigments, and numerous other chemical materials used by the industry. Clay usually is shipped in bulk in paper-lined cars, but it may be shipped, if desired, in paper or burlap bags, in barrels, or even in casks. Titanium pigments, on the other hand, generally are shipped either in 50 lb. paper bags or in 300-400 lb. barrels, most preferably in the paper bags.

Sulphur, and either limestone or lime are required in the preparation of the cooking liquor of the sulphite pulping process; soda ash and lime, the soda process (soda ash and lime or lime alone for the cooking of straw and rags); and salt cake and lime, the kraft or sulphate process. Alum and rosin are required for paper sizing; starch for paper sizing as well as for coating adhesives; and clay and titanium pigments as a filler and coating for paper.

Published estimates place the annual consumption of some of these materials by the industry as follows:

	Tons
Limestone	365,000
Lime	500,000
Sulphur	340,000
Salt Cake	583,000
Alum	143,000
Rosin	92,000
Soda Ash	199,000
Clay	530,000
Starch	109,000
Casein	11,000

(All estimates—with the exception of the estimate for lime—are for 1943. Lime estimate is for 1942.)

Specific cases are: (a) one sulphite mill burns approximately 27,000 pounds of sulphur daily to make enough acid to cook 125 tons of sulphite pulp, or, in other words, 216 lb. of sulphur per ton of pulp. (b) Another sulphite mill, operating on different wood species than the mill just cited, requires about 275 lb. of sulphur and about 350 lb. of limestone per ton of pulp.

The soda ash requirements of a soda mill run from 300 to 500 lb. per ton; the lime requirements, from 500 to 550 lb. per ton.

A sulphate mill uses from 250 to 300 lb. of salt cake and about 400 to 550 lb. of lime per ton. A considerable portion of the lime, possibly two-thirds, may be obtained by the reburning of the lime sludge which is obtained in the chemical recovery operations of the mill.

Coal must not be overlooked as an important commodity of the industry. Statistics compiled by the U. S. Bureau of the Census show that the coal consumption of pulp and paper mills for 1939 approximated 10,000,000 tons, nearly 8¾ million tons of bituminous coal, and about one million tons of anthracite.

Definite quantities of materials necessary to the running of the individual mill must be kept on hand to insure uninterrupted operations. This requirement means storage, and storage means double handling.

It should be the aim of every mill operator to keep this handling expense to a minimum. Provision should be made for ample and adequate storage space, properly located, and for the most efficient materials handling equipment for the individual job.

Also, there is the shipping and possible storage or interplant handling of both pulp and paper. Paper is handled either in roll or sheet form; but in mills where converting operations are performed, the final handling of the finished paper products often is done with the products in paper cartons.

The diversity of products used by the pulp and paper industry and the many products produced by the industry offer a challenge to the materials handling equipment industry. Proper application of equipment is essential to economical operation.

There have been many improvements in the design of materials handling equipment in recent years. There is still room for further improvement.

For many years, methods in felling trees and in the handling of the pulpwood itself did not change. It seemed that these methods were here to stay. But, the manpower shortage resulting from the war has made it imperative to develop equipment that would result in more wood for the mills. Today, power saws are being used for felling trees, for cutting off limbs and for bucking at speeds that were impossible by the old methods. Likewise, equipment has been designed for the loading of pulpwood onto a truck or other carrier that makes manual handling almost unnecessary.

If the materials handling equipment manufacturer is to obtain the largest possible volume of business from the pulp and paper industry, he should have a good knowledge of most, if not all, of the materials handling problems of the industry and should adapt his equipment to meet the needs of the industry as fully as possible.

The postwar situation of the pulp and paper industry has been epitomized in a very simple statement by a leading executive of the industry. He said, "In general, our plan is to make the best damned article we can at the lowest possible cost and take a chance on our ability to sell and distribute our merchandise in competition with others." Possibly, that plan would be equally effective for a manufacturer of any type of materials handling equipment.

Soap — for Paper Sizing

▶▶▶ In a technical bulletin "Soap Uses in Modern Industry," the Association of Soap & Glycerine Producers refer to editorial comment in a British publication, *Soap, Perfumery and Cosmetics*, which indicates that soap has possibilities as a paper sizing material. In full-scale mill tests performed by R. Carter and V. G. W. Harrison, 100 per cent kraft pulp was used on a machine run continuously for a period of three days. On the first and third days, normal rosin-alum sizing was used, but on the second day the rosin was replaced by soap. The soap employed was in the form of thin, fairly small flakes, containing 80.8 per cent fatty acid, which when thrown on top of the pulp in the beater, dissolved readily without lumpiness or frothing. During the whole of the run with soap, nothing unusual was noticed either in the beater or on the wire.

From the data obtained by these workers it was clear that soap-alum is an effective sizing agent, but a greater weight of soap was needed to get the same degree of sizing as with a given weight of rosin. However, the rosin was used under known, favorable conditions, whereas certain unknown factors may need further elaboration when soap is employed. Nonetheless, these experiments have proved that soap can be used successfully as a sizing agent on a plant scale. Indeed the finished soap-sized paper appeared normal in every way and no "soapy" feeling could be detected.

Sulphite Turpentine . . .

a Review of the Literature

Although the turpentine resulting in the sulphite process of pulping is not a material of great industrial importance in the United States at the present time, nevertheless a considerable amount of literature has been published regarding its production, purification, uses, and chemical by-products. The purpose of this article is to review the knowledge concerning that material in order that a historical background for further work may be established.

T. T. COLLINS, Jr.
Thilmany Pulp & Paper Co.

▸▸▸ WHEN WE CONSIDER by-product turpentine from the cellulose industry, it is not possible to dismiss easily the subject of sulphite turpentine merely because it has yet to find widespread production and industrial use in the United States. In the past, particularly during World War I, considerable interest was evinced in this chemical as a source of toluene to be used in explosives and much toward its utilization was accomplished on an experimental scale. However, in later years, it appears that investigation of sulphite turpentine in the United States has lagged and this review is presented with the hope that it will enable those interested in the subject to know what has been done in the past by other investigators. Earlier reviews on portions of this subject have been published by Austerweil (*1*), Weissner (*2*), and others.

Although Klason (*3*) in 1900 was perhaps the first investigator to point out that so-called spruce turpentine or sulphite turpentine and the chemical, p-cymene or cymol, are identical except for the impurities in the former, nevertheless, the operators of sulphite pulp mills were undoubtedly aware at an early date of the oily liquid resembling turpentine which is condensed and separates from the digester gases. Austerweil (*1*), in reviewing the chemistry of sulphite turpentine, pointed out that p-cymene was discovered in 1839 by Dumas and Peligot, who prepared it by treating camphor with phosphoric anhydride, and was later found as one of the components of several essential oils so that its chemistry had been investigated to a considerable extent many years before sulphite turpentine was recognized as a potential source of this mateerial. A few years after the initial work of Klason, Kirchner (*4*) listed sulphite turpentine as being one of the by-products of the sulphite pulping process for which there were no important uses and at this writing the author has been unable to locate any pulp mills in this country which are recovering p-cymene. However, during World I some p-cymene was recovered in Germany. Waller (*5*) pointed out in 1941 that in Sweden the scarcity of oils and solvents in general and of toluene (produced from p-cymene) in particular made sulphite turpentine recovery a necessity when in normal times price competition would make its production uneconomical.

Peterson (*6*) has attributed this lack of activity in collecting sulphite turpentine to the fact that recovery and purification make it higher priced than p-cymene from other sources. According to Jahn (*7*) and others (*8*), the oil is now being recovered to a considerable extent in Sweden where a shortage of that type of chemicals exists.

Production

Probably one of the chief reasons that the recovery of sulphite turpentine has not been more widely practiced is the small quantity which is ordinarily available in the individual mills. This, coupled with the low price of an impure raw material of this kind for which there is little demand, together with the price competition from other materials from which the same by-products can be made, results in there being no incentive to make extensive use of sulphite turpentine.

Schorger (*9*) listed the woods which can be used to produce sulphite turpentine. He stated the oil is produced from spruce and balsam but that no appreciable quantity is obtained from hemlock. Undoubtedly the pines also yield p-cymene whenever they are pulped by the sulphite process.

A considerable portion of the cymene produced in sulphite pulping probably cannot be successfully recovered. Koenig (*10*) stated that of the 8 to 12 kg. of p-cymene formed in the manufacture of a metric ton of sulphite pulp, only 0.1 kg. is obtained from the digester relief. Only 0.2 kg. ton out of a theoretical 2 kg. is recovered according to Lassenius (*11*). Tumbin (*12*) found that 25 to 45 per cent of the turpentine in the wood is lost on storage in the woodyard or from the chips before cooking and that a part of it remains with the cellulose after it is washed. Ortenblad (*13*) pointed out that the recovery depends upon the wood variety and other conditions; there being a higher production of the oil from green wood than from dry.

Because of the differing yields of sulphite turpentine given by the various sources, the following figures are listed. It is assumed that they are principally from the pulping of spruce since no differentiation has been made by the various investigators and undoubtedly the highest yields are from green wood. When the yield is given in kilograms, the production unit is a metric ton of cellulose produced. The yields calculated on the basis of pounds per ton of 2,000 pounds are based on a specific gravity of 0.86 for sulphite turpentine.

As can be seen from the figures in the previous table, the p-cymene yield varies considerably depending upon many factors. Because of the wide differences in these figures which have been reported in the literature, it would be difficult to estimate the possible world production of sulphite turpentine. However, a yield of one pound per ton of pulp based on a world production of approximately 8,000,000 tons of sulphite pulp in 1937 (*27*) would amount to only 22,000 barrels of 50 gallons each.

Wallin (*28*) has studied the economic aspects of sulphite turpentine recovery together with that of other sulphite process by-products. Another source (*18*) has stated that the cost of a complete recovery apparatus for sulphite turpentine was between $100 and $200 in 1918.

Collection

The sulphite turpentine is produced during the cooking of the wood and is present in the digester relief vapors. It condenses and accumulates as an oily layer over the liquor in the acid sump to which the gas passes since in most cases the relief liquor is added to fresh liquor for the next cook and any sulphite dioxide available is passed on to the liquor make-up system. Bergstroem (*29* stated that the aque-

ous portion of the digester relief condensate contains methyl alcohol, acetone, aldehydes, and traces of acetic and formic acids. This same author (*14*) later found the vapors condensed from the sulphite digester relief to contain sulphurous acid, methyl alcohol, cymene, furfural, and a solid terpene alcohol. According to Foulon (*20*), the non-condensable gases are carbon dioxide, sulphur dioxide, and nitrogen. Koch (*30*) cited the presence of a small amount of furfural in the digester relief gases.

Considerable emphasis has been placed on the desirability of removing the cymene formed during sulphite pulping so that contamination of the pulp will be held to a minimum. Bergstroem (*14*) pointed out that the quality of cellulose may be improved by removing the sulphite turpentine from the condensed relief before using it again in cooking. According to Kaminskii and Khodakov (*24*), any cymene which is left in the pulp dissolves resins and produces the gummy mass called pitch which causes serious trouble on the papermaking machine. Felton (*31*) suggested that the cymene be steamed out of the pulp as quickly as possible to prevent a lower quality pulp while other sources (*16, 32,* and *33*) claimed that cymene is partly responsible for difficulties with pitch in the pulp. Nickerson (*16*) made a cook in the presence of added sulphite turpentine and found that a very pitchy pulp resulted. He also found that pulp is easier bleaching when sulphite turpentine is recovered. Koch (*30*) patented a method for the removal of cymene and furfural from the relief vapors because he found that organic acids formed from them are deterimental in the cooking process.

Evidently several attempts to recover sulphite turpentine on a commercial scale have been made as a number of collecting systems have been described by various investigators. In his patent for the manufacture of sugar by the hydrolysis of coniferous wood with sulphuric acid, Tomlinson (*34*) has described an apparatus for collecting the by-product cymene consisting of a condenser and a simple turpentine-water separator. Enger (*35*) recovered cymene from relief gases and liquor by passing them into separating tanks connected at the bottom so that the oil was trapped in the quiet liquor above the outlet and inlet of each tank.

Obermanns (*15*), Fletcher (*36*), and others (*37*) have illustrated and discussed the cymene-collecting system used at one time in the Hammermill Paper Company's pulp mill. This arrangement of apparatus was said to be particularly suited to mills where the digester relief is separated into liquid and gas relief so that only the gas relief need be dealt with for cymene recovery. The relief gas was run through a condenser and the uncondensed gases were passed to the reclaiming tower while the condensate was run into a separating tank. Because of acid corrosion, the equipment was constructed of hardened lead.

Nickerson (*16*), who also has described several sulphite turpentine recovery installations, found that most of the oil is removed from the digester during the first three hours of the cooking cycle. Some data has been given by the same investigator concerning the amount of cymene formed during different time intervals in the cooking process. Corcoran (*38*) has patented a design for a reclaiming tank for sulphite turpentine in which relief acid can be mixed with fresh cooking liquor. Felton (*31*) described condensation of the sulphite turpentine in a lead coil pipe and its separation from the aqueous condensate in a storage tank.

Ortenblad (*13*) has discussed an apparatus used for cymene recovery in Europe. Relief vapors taken from the top of the digester were absorbed in "acid-cisterns" constructed with a conical top and when relieving ceased, the cymene floated on top of the acid. When the tank was refilled with raw acid, the level of the liquor was brought even with the top of the tank and the cymene was forced out through a pipe in the cone top into a separating tank where entrained acid was drained off. A somewhat similar arrangement has been patented in this country by Akerbloom (*39*) for more exact separation of the turpentine layer from the acid.

Khodakov (*26* and *40*) has described a procedure for recovering sulphite turpentine which is used in the Finnish cellulose mills and Kaminskii and Grebenev (*23*) have revealed many of the disadvantages of the Khodakov cymene separator. They found that the yield of sulphite turpentine with this apparatus can be increased if the temperature of the receiver for the relief gases is sufficiently high (90 C.) and a sufficient time is allowed for separation of the condensate into the acid and turpentine layers. Schmidt and Kahle (*41*) stated that the gases and condensate are not to be cooled below 30 C. in order to get sharpest separation of the two layers. Holtan (*25*) has introduced a method for obtaining cymene continually from the acid tank.

According to one group of patents (*42*), the waste gases from cellulose digesters can be cooled by stages to give water, water-oil, emulsion, and oil but allowing the sulphur dioxide to go to the crude acid system. In a patent issued to Edling (*44*), the uncondensable gases and the cymene are removed from the aqueous condensate by means of a specially designed apparatus and the liquor is returned to the system.

Another unique method (*30,* and *43*) for the collection of cymene concerns the use of Cottrell-Moeller electrical precipitation units for freeing the digester relief gases from organic constituents. It was said that when two of the precipitation units are used in series at different temperatures, it is possible to collect cymene in one and furfural in the other. This leaves the sulphur dioxide in a suitable form for making fresh acid.

One of the most modern sulphite

TABLE I

Cymene Yield	Calculated Yield lb./ton of pulp	Authority
0.36-1.0 gal./ton	2.6-7.2	Schorger (*9*)
0.1 kg./ton	0.2	Koenig (*10*)
2-4 kg./ton	4.0-8.0	Tumbin (*12*)
0.1 gal./ton	0.72	Ortenblad (*13*)
1-1.5 kg./ton	2-3	Bergstroem (*14*)
0.3 gal./ton	2.2	Obermanns (*15*)
1 gal./ton	7.2	Nickerson (*16*) and Anon. (*17*)
0.75 gal./ton	5.4	Anon. (*18*)
1 kg./ton	2.0	Aschan (*19*), Foulon (*20*), and Solodkii (*21*)
1.5-4 kg./ton	3-8	Ullman (*22*)
0.6 kg./ton	1.2	Kaminskii and Grebenev (*23*) and Kaminskii and Khodakov (*24*)
0.2-0.3 kg./ton	0.4-0.6	Holtan (*25*)
0.3-0.4 kg./ton	0.6-0.8	Khodakov (*26*)
0.2 kg./ton	0.4	Lassenius (*11*)
0.4 kg./ton	0.8	Waller (*5*)
0.5-1.5%	10-30	Austerweil (*1*)

turpentine recovery plants is that described by Waller (*5*) as having been installed in the Skoghalls mill in Sweden. The author pointed out that when the acid sump is not under pressure that it is a simple matter to draw off the oil layer but when the sump is under pressure, as it is in mills using the "hot digester" system, this separation is complicated and the apparatus he described was designed to solve this problem.

Composition of Sulphite Turpentine

The p-cymene which is produced in the sulphite process is not pure and is contaminated with other materials which are soluble in it, although some of them are only to a limited extent. A considerable portion of the other volatile materials produced during the cooking process are removed with the aqueous portion of the relief gas condensate.

That the separated crude, sulphite turpentine itself is a complex mixture has been shown by Bergstroem (*29*) and Bogert and Tuttle (*45*). Bergstroem fractionally distilled the crude oil between the limits of 150-270 C. to get a fraction of 7 per cent in the 150-160 C. boiling point range which is identical with the 149 C. fraction of sulphate turpentine. It contains no terpene and is probably an oxygenated compound. The main fraction in the range 160-190 C. amounting to 55 per cent was found to consist mainly of p-cymene and the fraction 190-210 C amounted to 17 per cent of the oil. A final fraction of distillate in the range 205-250 C. also was produced. Even after their sample of the oil had been carefully purified, Bogert and Tuttle (*45*) could not obtain a constant boiling point, density, or refractive index for the p-cymene fraction.

Koenig (*10*) divided the crude oil into six fractions by carrying out the distillation to 240 C. and 60 mm. of Hg absolute pressure. The first fraction at 174-178 C. under 740 mm. absolute pressure amounted to 38.6 per cent and was principally p-cymene. When the crude turpentine was first purified and steam-distilled, a yield of 47.2 per cent distillate was obtained which on fractionation gave 76.6 per cent p-cymene.

Solodkii (*21*) reported that the raw oil contains 3 per cent of material which is non-volatile with steam and if it is oxidized with potassium permanganate, 12-17 per cent becomes non-volatile when the turpentine is steam-distilled. This oxidizable portion contains no free acids or complex esters and the balance (82-87 per cent) of the sulphite turpentine is p-cymene.

Other sources have reported various amounts of p-cymene in sulphite turpentine. Nickerson (*16*), Waller (*5*), and Kertesz (*46*) mentioned 80 per cent cymene and Halse and Samuelson (*47*) together with another source (*48*) stated that sulphite turpentine is 90 per cent p-cymene.

A characteristic distillation curve for sulphite turpentine has been established by Halse and Samuelson (*47*).

An analysis of some of the high boiling fractions of raw sulphite turpentine oil has been made by Tutihasi and Hanazawa (*49*).

Wise (*50*) and Kertesz (*46*) have stated that dipentene is present in sulphite turpentine while others have found terpenes as constituents of the oil. Boedtker (*51*) reported terpenes while another source (*48*) said only traces of terpenes exist in this material. Solodkii (*21*) found the raw oil to consist of 11.5 per cent terpene alcohols and Bergstroem (*52*) noted the existence of various terpene alcohols in the mixture. Bergstroem (*29*) found a sesquiterpene in the fraction of the oil distilling above 250 C. and Wise (*50*) and Kertesz (*46*) mentioned their presence in the crude oil. The latter reported the possibility of polyterpenes appearing in sulphite turpentine.

Borneol, which has been reported as appearing in sulphite waste liquors

TABLE 2

USED BY	TREATMENTS												
	A	B	C	D	E	F	G	H	I—Alkali Used		J	K	L
Klason (3)	..	2	3	..	..	..	..	..	1	NaOH	..	..	..
Koenig (*10*)	..	2	2	..	..	..	..	..	1	$NaHCO_3$	..	..	..
Tumbin (*12*)	..	..	..	..	..	..	..	..	..	.....	..	1	..
Ortenblad (*13*)	..	..	..	..	..	..	..	..	1	Lime	..	..	..
Obermanns (*15*)	..	..	..	..	..	..	1	..	1	Lime	..	..	..
Nickerson (*16*)	1	2	..	..	..	..	..	..	1	Lime	..	..	3
Solodkii (*21*)	..	2	..	..	1	..	..	..	..	.....	..	..	..
Holtan (*25*)	..	1	..	..	..	..	..	..	2	.....	3	..	..
Felton (*31*)	..	1, 5	..	..	..	2	..	..	4	Na_2CO_3	3	..	..
TAPPI (*33*)	..	2	..	..	..	..	..	..	1	Lime	..	..	3
Enger (*35*)	3	2	..	..	..	..	..	..	1	.....	..	..	..
Bogert and Tuttle (*45*)	1, 3	..	2, 4	2	..	..	..	..	..	.....	..	..	..
Bergstrom (*52*)	1, 3	..	..	..	..	..	..	..	2	.....	..	..	..
Mann, Montonna, and Larian (60)	4	..	2	..	..	1	..	..	3	NaOH	..	..	..
Metall. Akt.-Ges. (*61*)	..	2	..	..	..	..	..	1	..	.....	..	..	..
Groggins (*62*)	2	..	..	..	..	..	..	..	1	NaOH	..	..	..
Kubler and Niethammer (*63*)	..	1	..	..	..	..	..	..	..	.....	..	2	..
Karvonen (*64*)	4, 5	..	6	..	..	1	..	..	2	NaOH	..	..	3
Phillips (*65*)	..	1	5	..	..	..	..	..	2	NaOH	3	..	4
Phillips and Gibbs (*66*)	..	2	6	..	..	3	..	..	1	Lime	4	..	5
Schorger (*67*)	2	..	5	..	1	3	..	..	..	.....	4	..	..
Wheeler (*68*)	8	1	7	..	3	4	..	..	2	NaOH	5	..	6
Kobe and Vittone (*69*)	6	..	5	..	..	1	..	..	2	Na_2CO_3	3	..	4
Austerweil and Lemay (*70*)	..	..	2	..	..	1	..	..	..	.....	..	..	..
Waller (*5*)	..	..	..	..	..	..	..	..	2	NaOH	1	..	..

A. Fractional distillation
B. Steam distillation
C. Treatment with or distillation from over metallic sodium
D. Treatment with phosphorous pentoxide
E. Oxidation with potassium permanganate
F. Oxidation with sulphuric acid
G. Oxidation with air
H. Treatment with hydrochloric acid
I. Neutralization with alkalies
J. Washing with water
K. Breaking the emulsion of water and cymene
L. Drying with calcium chloride

by Klason and Segerfelt (*53*) and others (*54*), has been found in the higher boiling fractions of sulphite turpentine. Bergstroem (*29*, *55*, and *56*) found that the fraction distilling in the 205-250 C. range solidifies in the condenser as crystals of borneol. Borneol in sulphite turpentine also was mentioned by Wise (*50*) and Wheeler and Harris (*57*), the latter finding that it amounts to about 2 per cent of the oil. Holmberg and Sunesson (*58*) have discussed the chemistry of some of the derivatives and isomers of borneol produced in sulphite pulping. The presence of borneol has been noted by Baroni (*59*), who speculated as to its formation.

Some investigators have found that there is a residue left from the fractional distillation of turpentine. Koenig (*10*) reported the residue as a brown resin, 25.9 per cent of the crude cymene, while another source (*33*) stated the residue from the first distillation to amount to only 8 per cent.

The presence of resins, fatty acids, and furfuraldehyde as impurities in sulphite turpentine has been noted by Boedtker (*51*).

Probably the most important impurity that occurs in sulphite turpentine, and one which must be removed before it is put to any use, is the sulphur dioxide that is absorbed in it. The importance of complete removal or neutralization of this undesirable component has been emphasized by Enger (*35*),Obermanns (*15*), Nickerson, (*16*), Koenig (*10*), Waller (*5*), and others (*33*). The fact that this obnoxious constituent is present makes necessary the purification of sulphite turpentine for any industrial uses.

Purification

A considerable amount of work has been done in the field of purifying sulphite turpentine. Boedtker (*51*) has given methods of removal of terpenes, resins, fatty acids, and furfuraldehyde but most of the literature concerns the removal of dissolved sulphur dioxide and the fractions of the oil which boil above and below the boiling range of p-cymene, and the oxidation of any other impurities.

Generally, the purification methods used by different investigators consisted of several steps, and especially is that true when the oil was being refined for technical studies. However, the steps or treatments that have been used are listed and the sequence of their applications can be outlined in Table 2. The numbers represent the order in which the operations were carried out. When the same number is given twice, it is meant that the steps were alternates.

One of the most thorough studies of sulphite turpentine purification has been carried out by Wheeler (*71*). His method and comments are outlined as follows:

1) Remove sulphur dioxide by

a. Extraction with water (laborous and slow).

b. Boiling the turpentine (explosions sometimes result).

c. Shaking with dilute sodium hydroxide (removes the sulphur dioxide but gives a precipitate which is difficult to handle).

d. Shaking with lime (this also yields a troublesome precipitate).

e. Drawing hot air through the turpentine.

f. Bubble air at room temperature through the turpentine. (The loss of cymene is only about 5 per cent by this procedure and this method was preferred.)

2) Distill the turpentine with superheated steam, passing the vapors through 30 per cent sodium hydroxide and then condensing them.

3) Other steps in purification

a. Shake the distillate with sodium plumbate solution.

b. Shake the distillate with 0.5 per cent potassium permanganate.

c. Boil the distillate in a stream of hydrogen through copper chloride distributed upon pumice stone.

d. Boil the oil with metallic sodium.

e. Shake the oil with concentrated sulphuric acid. (This sulphonates the oil.)

4) Shake the oil with 5 per cent sodium hydroxide and distill from over metallic sodium.

The importance of eliminating the corrosive action of the sulphur dioxide dissolved in the sulphite turpentine by treating it with lime has been observed by Obermanns (*15*), Nickerson (*16*), Groggins (*62*), Phillips and Gibbs (*66*), and others (*33*). This is particularly necessary when the oil is to be stored or shipped in metal drums or tanks. One of these, Nickerson (*16*), suggested the use of 3 pounds of lime for each 50 gallons of turpentine for neutralization.

Breaking of an emulsion of turpentine in water has been studied by Kubler and Niethammer (*63*), who separated the emulsified oil from the aqueous portion of the condensate by the use of a vacuum. Separation of the cymene from the water emulsion filtering the condensate through gypsum or sand has been recommended by Tumbin (*12*). Waller (*5*) found that treatment with alkali produces an emulsion of the oil in water which is difficult to break.

Mann, Montonna, and Larian (*60*) found a step in the procedure of Wheeler (*71*); i.e., blowing air through sulphite turpentine to remove the sulphur dioxide, to be too time-consuming. These same authors have pointed out that the objectionable, malodorous, and corrosive components of sulphite turpentine boil below 173 C. so can be removed by simple fractionation. They also used a 30 per cent sodum hydroxide wash.

In a special report issued by TAPPI (*33*), it was suggested that the sulphite turpentine should be steam-distilled and the first 15 per cent should be discarded because it contains most of the sulphur dioxide. The cymene layer might then be separated from the aqueous condensate and run over anhydrous calcium chloride to remove the water. A special arrangement of the calcium chloride drying apparatus has been described by the same source.

The method of purification patented by a German firm (*61*) consisted of treatment of sulphite turpentine with gaseous hydrogen chloride followed by steam-distillation. With this method, it was claimed that the impurities are not destroyed but can be reclaimed as by-products. The yield of p-cymene was said to be 77 per cent of the crude turpentine when purified by this method.

Phillips (*65*) found that Schorger's method (*67*) of purifying sulphite turpentine with as many as thirty successive washings with fresh portions of concentrated sulphuric acid did not cleanse the oil to the point where there was no yellow coloration produced. However, Wheeler and Smithy (*72*) purified cymene with sulphuric acid to eliminate the yellow color which sulphite turpentine acquires on standing. Kobe and Vittone (*69*) shook the crude oil with concentrated sulphuric acid until the acid layer no longer became colored.

Wheeler (*68*) used caustic to decolorize the oil. He steam-distilled the crude turpentine through hot 10 per cent sodium hydroxide solution then condensed it.

Some investigators used fractional distillation under vacuum in their procedures of purification. This has been mentioned, in connection with other treatments, by Koenig (*10*), Bogert and Tuttle (*45*), Mann, Montonna, and Larian (*60*), Karvonen (*64*), and others.

Waller (*5*) found that it is difficult to remove all the sulphur dioxide dissolved in sulphite turpentine by washing with water if the water is cold.

A total cost of $0.10 per gallon for purification of sulphite turpentine was given in 1927 by Groggins (*62*). The method of treatment on which

(Concluded on opposite page)

Papermakers Should Capitalize Services of the Sales Engineer!

BERNARD LESTER, Assistant Industrial Sales Manager
Westinghouse Electric Corporation

▶▶▶ SINCE WE WERE YOUNG, all of us have been acquainted with the sale and distribution of commodities and standardized articles, for merchandising is an old science and selling an old art. But Sales Engineering is a new art, born from a rapid advance in the use of machinery and the development of new technical processes. It is a lot different from selling merchandise, and it is rapidly coming to the front as a distinct, necessary, and creative profession.

Though the merchandise salesman must know his product and the market for it, primarily he is a business man with promotional ability. The Sales Engineer is an *engineer* who also possesses business and promotional ability. That which he sells is technical in character, and his work combines both engineering and business skill. Furthermore, he must be an expert in his application and use of the apparatus he sells, and that means intimate familiarity with the technique and economics of industrial processes producing products and services. What he sells is usually of no value in itself—it is only of value when correctly put to use in relation to an operating system or installation. In combining engineering and selling skill the Sales Engineer promotes the use of his apparatus; he acts as a consultant to the purchaser, and is a "problem-solver"—both technical and economic—as relating to a given process.

Think of the Sales Engineer as having an engineering eye and a business eye; on the one side he puts forth recommendations; on the other he is a helpful consultant. At the top, is a brain that studies problems and offers solutions, and at the lower end a couple of legs that take this combination into plants where his apparatus is purchased or can be put to profitable use.

For the most part the Sales Engineer represents machinery and equipment builders. He supports his efforts by selling products, but in the long run these sales come as a result from rendering the character of service mentioned. To be successful, he must be a "long-time operator," gaining the confidence of the purchaser through skillful recommendations and never promoting the sale of unnecessary or unsuitable apparatus. Primarily, he is selling a means of reducing cost, increasing profit, improving a product or service, or meeting a condition of changing volume output.

I don't want to sketch the Sales Engineer as an "altruist" or a "wizard." Even though the profession is still young, there are today many examples of mature Sales Engineers performing an outstanding creative service in the field of technical mechanization, in such industries as pulp and paper, chemical, steel, petroleum, metal treatment, mining and construction as well as in the fields of furnishing power and transportation, as well as many specialized processes cross-sectional to all industry, such as engineering installations involving machine tools, arc welding equipment, electroplating equipment, air-handling systems and water supply and water purification apparatus. In each instance the Sales Engineer bases his services on wide but specialized experience through contact with a number of plants and processes.

Before us lies a period of reconversion and rehabilitation engendered by inventions and skills from the impetus of a world-wide technical war. Many new products will appear requiring new processes and new apparatus needs; and also, sooner or later, a period of keen domestic and foreign competition. Above all, labor will continue to cost more, and though the cost accountant views it as a commodity, it is far more, and has an increasing implication to all users of apparatus as well as Sales Engineers, for apparatus must satisfy the worker. Now is the time for the producer to earnestly consider how to profit best from the services of the Sales Engineer.

In the producer's organization, with whom should the Sales Engineer have access to in order to be most useful?

Certainly the *purchasing agent*, for it is he who selects many products bought, places the actual orders, and follows all purchases. For the less experienced purchasing agent, or those in isolated centers, the Sales Engineer often can perform a service of directing him to less known suppliers of peculiar products infrequently needed.

Most important of all, and especially to the purchasing agent himself, the Sales Engineer should have access to *plant engineers*—those responsible for the character of the equipment and layout for plant replacements or extensions. The Sales Engineer must know present operation conditions and those to be met. Since he visits many plants, he gains a wealth of information; and though he is not a "peddler of ideas" or a "tattle-tale," his accumulated experience can be of enormous value. For instance, paper and pulp mills use large quantities of power and steam. Problems involving the extent to which power should be generated or purchased may be very pertinent, and the Sales Engineer handling steam-generating and steam utilizing equipment can intelligently analyze local conditions and greatly assist paper mill engineers toward a correct solution. Heating and drying installations are likewise highly important, and the Sales Engineers of equipment manufacturers specializing in this equipment for the paper mill field can solve problems and can provide suitable apparatus with an authority based on extensive experience. Hence, a chief duty of the chief engineer of the mill is the co-ordination and evaluation of the talents and recommendations of a group of sales engineers, each one a specialist in a line of work.

There are shining examples of remarkable accomplishments in making steel cheaply resulting from a skilled

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Sulphite Turpentine . . .

his calculations were based consisted of a caustic treatment and fractional distillation.

The economic and technical advantages of purifying all the sulphite turpentine produced within a certain section in one central plant has been discussed by Wallin (*28*), Groggins (*62*), and others (*37*). Due to the small yield of this material which would be obtained in any one mill, it might never be economically feasible for individual plants to process their by-product turpentine.

EDITOR'S NOTE: This article is in two parts. Part II (including bibliography) will appear in an early issue of this magazine.

triumvirate—(1) the steel mill engineer, (2) the Sales Engineer representing the steel mill machinery manufacturer, and (3) the Sales Engineer representing the electrical manufacturer. The same may be said of the modern paper machine drive, for its perfection results from three such types of individuals, and this holds true of any complicated equipment, depending on the exact use and control of electrified power.

The operating head or mill superintendent can benefit greatly by the services of the Sales Engineer, for he is responsible for the best operating results obtainable from the equipment installed. The capable mill superintendent is never fully satisfied with operating results. He has to consider at all times:

a) an improvement in the quality of the product

b) reduction of production costs

c) stoppage due to breakdowns or other causes

d) the safety and welfare of employees

e) reduction of maintenance costs

f) demands for peak production or reduced output

In the operation of a paper mill, for instance, the superintendent frequently should have problems to present to the Sales Engineer—operating troubles that are annoying and must be eliminated. Again it may be that the Sales Engineer could be of assistance in the trial of new auxiliary equipment, or features that hold promise for favorable results in the elimination of waste in time and materials. Often the Sales Engineer can recommend the trial of equipment he himself does not furnish, for he knows his help to the average mill superintendent will be rewarded, and improvement in the mill brings a reflected benefit to the apparatus he has furnished.

All operating apparatus requires attention, and the *maintenance engineers* should be thrown in close contact with the Sales Engineer, to get his help, not only in repairing and caring for apparatus, but also in becoming familiar with details of its construction. The Sales Engineer benefits from such contacts, for he can learn of weakness and possible improvements to be made in the apparatus he furnishes.

There are many specialized processes requiring apparatus not peculiar to one industry. Arc welding is an example, and though such a process may not be a part of manufacture, as a means of maintenance and repair, its advantages hold true in most plants. Obviously, the Sales Engineer furnishing this equipment is in a position to intelligently analyze plant requirements, to recommend suitable apparatus and help in training the purchaser's personnel to use the equipment most efficiently.

A reliable and economical water supply is important in most plants, particularly in the pulp and paper, textile, and chemical fields. Some pump salesmen may ask "what you want" and are glad to take the order, but the experienced Sales Engineer representing a reliable supplier is in reality a hydraulic engineer; he is an expert in the broad matter of getting the best permanent water supply.

I have seen experienced Sales Engineers help in many other ways: assisting in the complete layout of the plant, conferring with consulting and contracting engineers employed, supporting the smaller producer in obtaining financial or credit help by explaining to non-technical bankers the advantage of investment in technical equipment, help in making distant contacts should the Sales Engineer's organization be far-flung in character, and help in training the purchaser's engineers and service men by having them spend a few days at his factory headquarters.

Don't forget that the Sales Engineer representing a reliable company has behind him a wealth of talented engineers' designing apparatus, or specializing in its use for a highly technical service. It might be apparatus for pumping unusual liquids, a highly specialized conveying system, a complicated temperature and humidity control, a peculiar dust elimination problem, a problem requiring a detailed knowledge of electrical control, high frequency dielectric heating, and a host of others. Get the salesman to bring to you the best talents within the range of his company activities and put them right up against your problems, giving them all the necessary facts with which to work.

Beware of the Sales Engineer:

Who tells you his competitors' apparatus is "no good"

Who loses interest after he gets the order, and fails to follow up the apparatus he sells

Who is a poor loser

Who answers only to those problems where he can pick up an order and run

Who dodges difficulties, fails to analyze them with you and always palms them off on others

Who fails to work with other suppliers, paralleling his own equipment.

Who furnishes you with a sloppy proposal—incomplete, inaccurate or obscure

Who *always* has a quick answer, right or wrong, never admits he doesn't know and is unwilling to obtain technical details from others in his organization for your use

Who never furnishes you with valuable suggestions

Yes, the capable Sales Engineer is creative. He builds business for himself by helping his customers build their business. Use him, he will be a very constructive force in these times to come of rehabilitation and re-equipment.

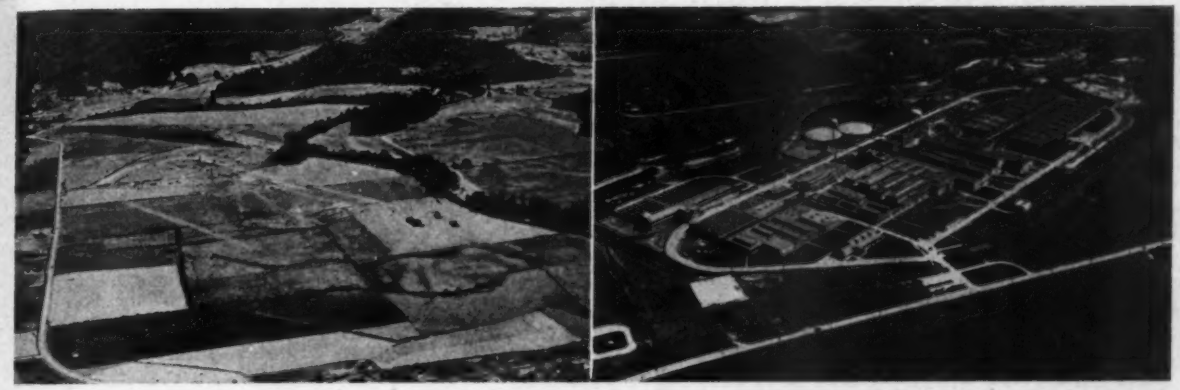
Maximum Fuel Conservation Urged*

▶▶▶ Despite Victory in Europe, the general fuel picture is no brighter than last year this time, and Bureau of Mines officials have asked members of the National Fuel Efficiency Council—a group of leading fuel and combustion experts—to redouble their efforts toward maximum fuel conservation among industrial and commercial consumers. Estimates of the 1945 bituminous coal shortage still range as high as 40 million tons.

Since the last meeting of the Council in February, emphasis has been shifted from organization of the program to execution of its goal—an annual saving of 29 million tons of coal and proportionate economies in the use of oil and natural gas through more efficient utilization. With 197 co-ordinators 816 advisory committeemen, and several thousand regional engineers now actually operating, plant pledges of co-operation have increased to about 12,800, an advance of 42 per cent in about three months. In each of these plants, a waste chaser had been appointed by the management to put into effect the tips on effective fuel usage provided by the Bureau of Mines and the volunteer regional engineers. Having completed an initial canvass of the major fuel consumers in their areas, some of the regional engineers now are making rechecks of their assigned plants, determining fuel-saving accomplishments and offering more technical service.

Reporting on the preparation and distribution of technical literature, Bureau officials said that 40 quiz sheets have been issued; seven are being printed, and three others are nearing completion. Covering virtually every phase of fuel utilization, these sheets incorporate the latest information available in industry and the Bureau of Mines on fuel-saving practices.

*From *Industry and Power*, July, 1945.



Ecusta in 1938 and today. The plant occupies an 85-acre area, a few years ago only farmland and forest

Fine Papers from Domestic Flax . . .

The Story of Ecusta

S. R. BROOKSHIRE

▸▸▸ ONE IMPORTANT INFLUENCE of world wars apparently is to stimulate efforts to make the United States independent of foreign sources for more materials and articles in everyday use.

Some of our new products have been developed mainly as safeguards in time of war; others as a consequence of greatly increased demands and the uncertainty of imports which exist during peace or war. This has been true with respect to many industrial chemicals, drugs, metals, mechanical devices, optical glass, new types of rubber, and textiles.

The list of goods "Made in America" mainly because of necessity, self-reliance and free enterprise, is impressive. One of the latest additions in this list is fine flax paper, produced directly from domestic flax.

As everyone in the industry knows, the chief source of raw material for making cigarette paper and similar grades of paper has been linen rags. The linen industry thrived in European countries because of favorable climates and soils for raising the tall fiber variety of flax; the cheapness of peasant hand labor in separating the fibre from the woody core as a preliminary to making linen cloth; and low pay to rag pickers for collecting discarded linen for the paper mills. Consequently, up to World War II, France had a monopoly, and was the principal source of the annual supply of $10,000,000 worth of paper used by American cigarette manufacturers.

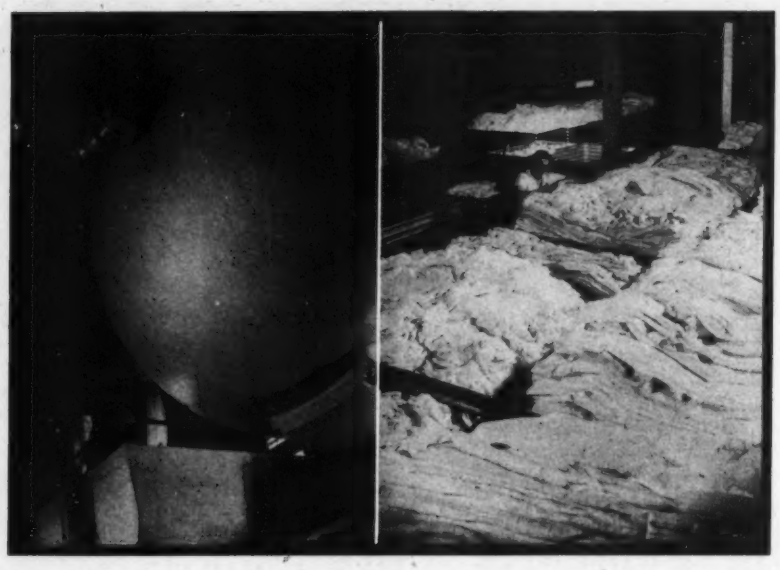
All this has changed, due to the foresight and determination of Harry H. Straus, founder and president of the Ecusta Paper Corporation, Pisgah Forest, North Carolina. This company has upset traditions, devised new processes, and established a new type of paper industry. It is now supplying the major part of all cigarette papers required in this country; is expanding its facilities, and manufacturing fine text paper for air mail and other writing and printing purposes. The era of high-grade, fine, lightweight papers produced on a large commercial scale, economically, apparently has arrived.

Harry H. Straus, founder and president Ecusta Paper Corporation

Straus came to this country in 1902, at the age of 18. He first worked for a company making cork tips for cigarettes, and later as a cigarette paper salesman. He imported paper from France, and to make sure of his supplies, he acquired control of a French mill. French factories were then making about 90 per cent of the cigarette paper used in the United States.

"Back in the early 1930's, the question of raw materials first turned our thinking to America," says Mr. Strauss. "It was our belief that we in this country should not be dependent upon foreign sources for our raw materials. My hope was to manufacture an American product, of American raw materials, made by American men and women."

The flax chiefly raised in the United States is not the tall fibre variety as developed in Europe for linen; it is a short plant grown for seed from which to extract linseed oil. Efforts to devise chemical or mechanical processes to produce clean flax fiber economically from domestic plants failed. Some leading authorities on the subject assured Mr. Straus that it could not be done.



LEFT—View of one of the spherical rotary digesters. . . . RIGHT—Unbleached pulp ready for washers and bleachers

Straus's brother, Dr. Fritz L. Straus (who died in 1942), was a chemist and physicist of considerable ability; and the two brothers, working with other chemists and engineers, after years of research developed a washing process that promised economical production of fiber from the European variety of plant. Their agronomists, however, were unable to develop this strain on a commercial scale. Hundreds of acres of imported and domestic varieties were planted in various sections of this country. In 1934, more than 600 acres of flax were under experimental cultivation in Estil, South Carolina. Despite the most careful attention to them, however, Straus could not raise enough of the right kind of flax to compete with the price of imported paper or rags. It looked so hopeless that he turned his attention to hemp, made some progress in experimental work, when the new federal law against marijuana ruled that out.

Back again to flax, he had his engineers work with the only kind of flax raised in this country—the linseed variety. By adapting their own washing process to it, they found that satisfactory fiber could be produced economically.

Mr. Straus shipped samples of this American fiber to France, had his mill manufacture it into cigarette paper. War clouds were then gathering over Europe. He showed his paper to American cigarette companies; they offered substantial financial assistance in the paper manufacturing project. Plant construction at Ecusta began in June, 1938. Eleven months later, French craftsmen arrived to teach the people of the North Carolina mountain area, who previously were unskilled in industry, how to make cigarette paper. On the day war broke out in Europe, Ecusta began to make paper for shipment to the major cigarette companies—and saved them from a serious quality paper shortage.

"We had a terrific time finding how to use the American raw material, which, until the time we began to use it, had been a waste product," says Mr. Straus. "Today, therefore, I look with great pride upon our warehouses with more than a year's supply of flax fiber ready at our hands. The problem of raw material has been solved. At a time when shortages abound, we can be happy in the knowledge that we have about 40,000 tons of flax fiber in our 25 great warehouses which protect or customers and insure the continued operation of this company."

The practical significance of the new industry is expressed in the following terms:

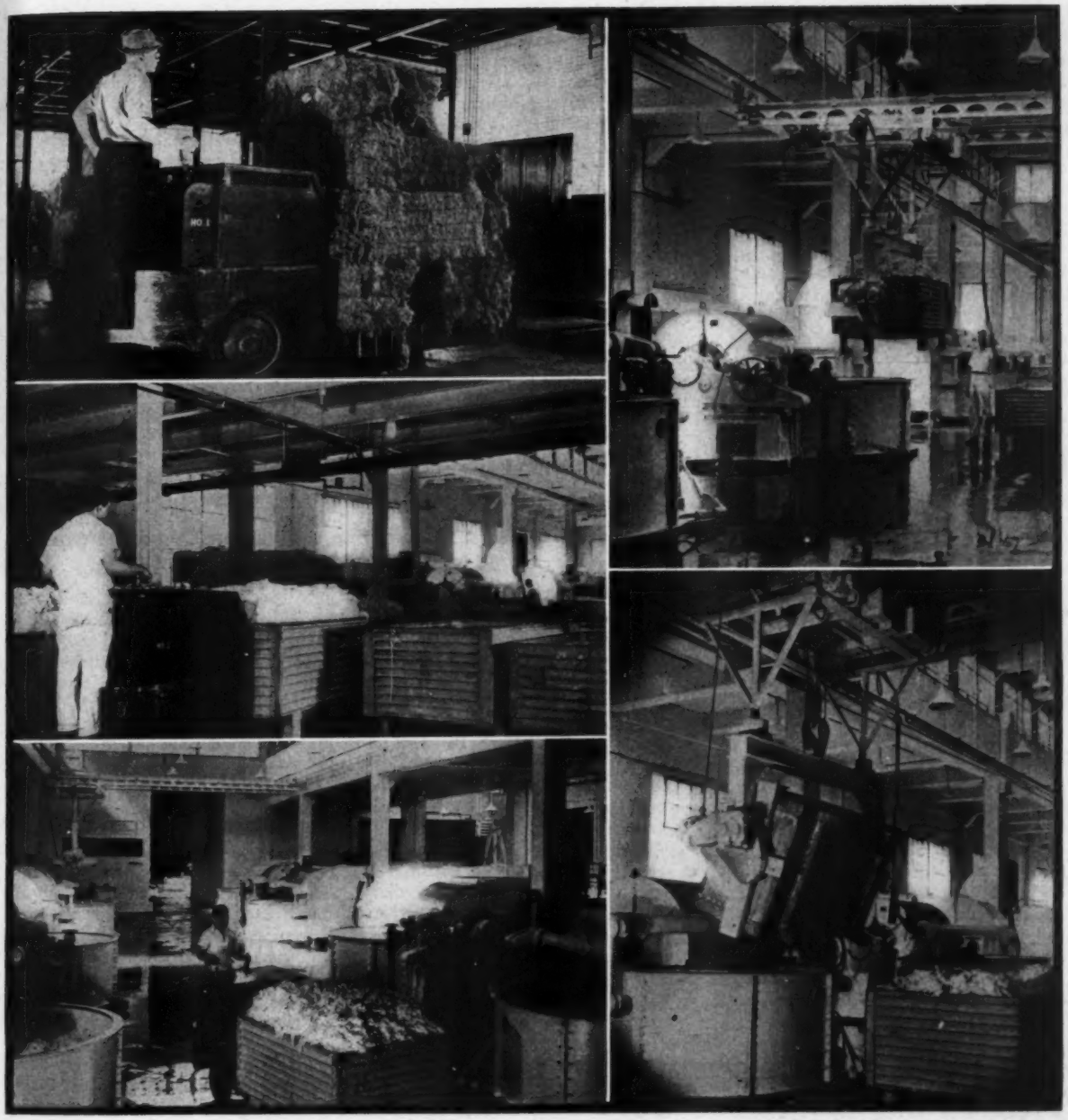
Without Ecusta, high quality cigarette paper would not be available during this war period in quantities large enough to manufacture cigarettes for our Armed Forces, let alone the ever-expanding civilian needs.

An important source of federal and state tax income has been protected. Internal Revenue taxes on cigarettes in 1943 amounted to $835,230,773.

The cost of cigarette paper, which went up 600 per cent during World War I, has not increased in World War II.

The quality of Ecusta cigarette paper is said to be superior to any heretofore available to Americans.

LEFT—Line of pulp washers and bleachers. . . . RIGHT—One of the eight fourdrinier machines from the dry end



LEFT (at top)—Handling bales of flax straw. The other four illustrations in this group show low-lift platform electric-power trucks delivering bleached pulp to overhead conveyor in beater room for distribution to beaters. (All five photos courtesy The Elwell-Parker Electric Company)

Farmers have a new cash crop, derived from flax, which is steadily increasing their income.

The new industry has provided opportunities for employment to thousands of Americans, and has raised living standards in the communities in which they live.

Pure air, pure water, no possibility of contamination from nearby industry, excellent local people and a location convenient to the great tobacco companies made Pisgah Forest first choice as a site for the plant. Ecusta's filter plant, capable of handling 25,000,000 gallons of water every 24 hours, is one of the most modern in the world.

When the site was under consideration, the water of the Davidson River, which flows directly into Ecusta's property, tested 99 per cent pure. The stream flows from a natural watershed and furnishes an abundant supply of mountain water. The Cherokee Indians called the river "Ecusta," which in their language meant "galloping waters."

Decorticated flax straw is received at the plant in the form of bales from farms in California, Minnesota, Iowa, North and South Dakota. This raw material is pressure cooked in spherical rotary digesters, in which steam and chemical reagents serve to loosen the noncellulose material from the usable fiber. The product is then transferred to washers where it is agitated and flooded with water until the fiber is freed of all extraneous material. The next steps are to process the fiber with chlorine and then thoroughly wash. More than 12,000,000 gallons of pure water are required every 24 hours.

The processed pulp is conveyed to the beater room where 88 beaters are installed for treating it. Here calcium carbonate is added to control porosity of the paper and to assure proper burning rate.

A mixture of 200 parts of water to one fiber is fed to any one of eight fourdrinier machines, which deliver the paper in jumbo rolls 100 inches wide.

In the finishing operation the jumbo rolls are slit into bobbins ready to be used by cigarette manufacturers. This department has a daily production capacity for 20,000 bobbins; 85,000 cigarettes can be made from each 6,000-meter bobbin.

An elaborate system of quality controls characterizes the process, as cigarette paper must conform to these standards:

1) Pure white and opaque
2) Completely tasteless—directly and when burning
3) Must burn at the same rate as the tobacco
4) Must be thinner than the diameter of human hair (less than 1/1000ths of an inch)—yet elastic and strong
5) In a strip, the width of an unrolled cigarette, it must carry a weight of eight pounds
6) It must not stick to the lips
7) It must be sufficiently moisture-resistant so that the cigarette will not become soggy after contact with the lips

What Mr. Straus and his associates did—in substance—was to short-cut the flow of materials, eliminating the long, circuitous route between flax and paper formerly considered necessary.

The mill is located on an 85-acre tract. Five acres of warehouse floor space hold huge stockpiles of fiber in bales weighing 160 pounds each. Endless conveyors stack these in the warehouse. The bales are bulky and slippery, offer a poor hand hold. In countries where standards are low, these would be trundled about by unskilled laborers. However, in this plant equipped with power industrial trucks, 15 bales make a one-man load, from warehouse to cookers.

Quick, safe, and economical transportation of material from one operation to another is provided by the trucks, as the movement is adjusted to the capacity of the processing equipment. Wet pulp is transported in boxes mounted on skids. Practically all mobile, floor or ground-level materials-handling, is accomplished by means of these trucks.

Despite the fact that this mill would rate as an ultra-modern mill, the company still is not satisfied with the plant as it is today, and is actively planning for the postwar period.

In addition to research work in North Carolina, the company's field activities in developing and securing raw materials include extensive operations in California and Minnesota. In the interest of permanency and improvement of the crop, an agronomist, Dr. W. W. Brookins, is located in Minneapolis and co-operates with farmers and state and federal agencies toward obtaining larger and better flax crops. Research fellowships are maintained in the University of Minnesota and the University of California. Ecusta's agricultural work, based on a 10-year plan, which eventually may have a far-reaching influence on the paper industry, includes:

1) A fundamental research of the botany and culture of the flax plant in terms of life processes, structure, agronomy and genetics
2) Investigation of industrial technology of flax fiber and other fiber-bearing plants
3) Establishment of standards
4) A survey of the technology of linseed
5) Fiber supplements or substitutes for flax

Ecusta's researchers are also engaged in the study of the possible uses of the various by-products, with the idea of turning waste materials into useful products.

Accidents and Light

J. L. KILPATRICK, Illuminating Engineering Department
Westinghouse Electric Corporation

Gentlemen—the eyes have it!

With about 87 per cent of our impressions being visual, there can be little doubt that the eyes hold the potential crux of accident prevention. In order to avoid any accident it is essential that the hazard be seen in sufficient time for proper action.

Seeing is the only one of our five senses which is dependent on some other factor. In other words, it merely requires the presence of a substance which will act as a stimulus to our other four senses in order that we may hear, touch, smell or taste that substance. However, while our eyes may be perfect, while there may be plenty of objects to be seen, if there is no light—our sense of sight is useless.

Good lighting is an absolute necessity for accident prevention. If the man who tripped on a tool in the dimly lighted aisle had seen it in time to avoid the hazard, lost production time due to his broken leg would not have occurred.

If glare had not temporarily blinded him, that pattern maker would not have lost those fingers.

If that heavy shadow over the press had been eliminated, that worker would still have his hand.

If there had been good lighting, someone would have seen that casting slipping from the crane hook and that man would not have been killed.

Industrial accidents can be reduced by the installation of good lighting. Hundreds of factories, large and small, have lighting systems wholly inadequate for safety. Inadequacy may exist in new installations.

Good lighting must be engineered to prevent eye-fatigue, to eliminate glare, both direct and reflected, to minimize shadows and to provide see-ability for the prevention of accidents. There are a number of light sources and innumerable lighting fixtures which, properly engineered, can provide good lighting for any specific plant. It is essential that competent illuminating engineers should be consulted when changes in lighting are contemplated.

Providing good lighting on the basis of the initial installation is not enough. The lighting system must be maintained and a depreciation factor must be provided in the design of the lighting system. Otherwise, an installation which was quite satisfactory when installed may, in a comparatively few months, produce a lighting result which is only one-half, or even one-third, as much as the original. Thus, it becomes obvious that poor lighting maintenance in itself produces an accident hazard.

No matter what kind of plant you operate, no matter how few or how many workers you employ, your accident records will be better, just as your production records will be better, if you provide good lighting which results in see-ability. But always remember that you must provide that good lighting continuously.

When workers can see clearly, quickly and easily they are able to work better, faster and more safely. They are less likely to be injured at the machines they operate or by falls from hazardous obstacles.

For safety's sake—let there be light! Make sure your workers see! Light is cheap—sight is priceless!

German Research on the Use of Sodium Chlorite In the Manufacture of Wood Pulp and Cellulose

G. P. VINCENT, Technical Director
The Mathieson Alkali Works (Inc.)

▶▶▶ INFORMATION on the use of sodium chlorite for bleaching wood pulp reached Germany through articles by Taylor, White, and Vincent*.

The data presented by these workers greatly interested German paper technologists, and they began studying the action of sodium chlorite on various cellulosic materials.

The results of some of this research have become available in this country; and the reports are summarized in a series of three articles, covering (1) bleaching wood pulps with sodium chlorite; (2) digesting cellulosic raw materials in sodium chlorite; and (3) securing pulps of maximum yield and strength characteristics with the aid of sodium chlorite.

1—Bleaching Wood Pulps with Sodium Chlorite

Comparing Chlorite and Hypochlorite—Dr. Hermann Wenzl[1], in a report of the Research Laboratory for Paper and Cellulose Chemistry, Berlin-Charlottenburg, gives the results of experiments comparing sodium chlorite with calcium hypochlorite as a bleaching agent for wood pulp.

The pulp used in these experiments had a high alpha-cellulose content and was prepared by treating beech chips with an alkaline digestant. It was then bleached by a two-stage process in two ways: (a) with chlorine in the first stage and an alkaline solution of hypochlorite in the second stage; and (b) with chlorine in the first stage and an acid solution of sodium chlorite in the second stage.

Table 1 shows the amounts of bleach used with two lots of pulp which differ in the degree of digestion as indicated by the chlorine numbers.

Table 2 shows that, as compared with the hypochlorite-bleached pulps, those bleached with chlorite were higher in alpha-cellulose and lower in the "total alkali solution" factor (beta- and gamma-celluloses combined), although the gamma-cellulose content was higher in Lot 310. Copper numbers and resin contents were

(*) The author, whose company, The Mathieson Alkali Works, made this product available on a commercial scale in the United States in 1940.

Calculating the Quality and the Total Quality Numbers

In calculating the *quality number*, the characteristics of the pulp, which must have a slowness of about 50 deg SR, are evaluated as percentages of the following figures, which are rated at 100:

Breaking length	10,000 meters
Stretch	5 per cent
Bursting strength	10 kilos per sq. cm
Double folds	5,000
Tearing resistance	25 cm gr/cm

The number is found by first taking the average of the first three percentages and, secondly, the average of this mean value and the last two percentages.

The *total quality number* is calculated from the formula:

$$\frac{\text{quality number} \times \text{whiteness}}{100}$$

To illustrate, the numbers for pulp Bb2 in Table 6, were derived as follows:

Breaking strength	8100	= 81.0%
Stretch	3.61	= 72.2%
Bursting strength	5.24	= 52.4%
Average of above percentages		68.53%
Double folds	3225 =	64.50%
Tearing resistance	208 =	83.20%
Quality number (average)		72.10%
Total quality number	82.4 x 72.10 =	59.4%

$$\frac{\quad}{100}$$

Table 1—Bleach Consumption—in terms of available chlorine, calculated as of per cent of air-dried pulp

Pulp Lot No.	Pulp Chlorine Number	Bleach Consumption		
		Chlorine	Hypochlorite	Chlorite
306 a	6.1	2	2	..
306 b	6.1	2	..	2
310 a	14.6	4	4	..
310 b	14.6	4	..	2

Table 2—Composition and Properties of Bleached Pulps

	Pulp Lot 306		Pulp Lot 310	
	Hypochlorite	Chlorite	Hypochlorite	Chlorite
Alpha-cellulose*	96.60	97.25	96.47	97.70
Beta-cellulose	1.90	1.57	2.19	0.78
Gamma-cellulose	0.68	0.60	1.04	1.55
Total alkali soluble	2.58	2.17	3.23	2.33
Copper number	0.51	0.48	0.84	0.54
Wood resin	0.0	0.0	1.84	1.69
Pentosan	5.61	5.81	4.24	4.56
Whiteness	84.50	85.59	81.10	81.89

(*) Alpha-cellulose content of unbleached pulp was 97.04 for Lot 306 and 99.15 for Lot 310.

Table 3—Physical Properties of Test Papers
U = Unbleached Pulp H = Hypochlorite—Bleached Pulp C = Chlorite Bleached Pulp

Pulp Lot	Milling Time Minutes	Slowness of Pulp deg. SR			Breaking Length Meters			Stretch, per cent			Bursting Strength Kilos per sq. cm			Double Folds		
		U	H	C	U	H	C	U	H	C	U	H	C	U	H	C
306	120	43	66	44	5483	5835	5893	2.55	2.63	2.23	2.01	1.99	1.98	77	86	88
306	180	65	..	68	6413	....	6428	2.70	...	2.80	2.50	...	2.29	382	..	229
310	150	35	72	41	3933	4410	4928	1.50	1.83	2.00	1.21	1.24	1.44	8	10	20
310	250	..	..	74	....	....	5350	...	...	2.50	...	...	1.83	..	..	66
	300	76	..	..	5335	....	....	2.18	...	...	1.69	...	...	52	..	..

lower; pentosan contents were higher. A better white was obtained with the same consumption of chlorine in Lot 306 and with a saving of 25 per cent in Lot 310.

To determine the relative physical characteristics of the bleached pulps, they were milled and made into test papers by a standardized procedure which was varied only by grinding different portions of the pulps different lengths of time, thereby producing lots of different slowness (measured in Schopper-Riegler degrees). The results of the tests are given in Table 3.

Wenzl concludes that sodium chlorite is an exceptionally effective and non-destructive bleaching agent which is particularly suitable for pulps that are sensitive to oxidation. When used in the final stage of a multi-stage bleaching process, it produces pulps that excel in good chemical test values and strength characteristics. Under properly controlled conditions, it will develop better whiteness than hypochlorite, with a substantial saving in chlorine consumption.

Bleaching a Pulp Rich in Lignin with Chlorite —Jayme and Mo[1] of the Institute for Cellulose Chemistry, Darmstadt, put sodium chlorite to an extreme test by using it for bleaching a sulphate pulp having so high a lignin content that it was pronounced unbleachable by any known commercial method.

This pulp was prepared by picking out by hand the smallest knotty pieces from the spruce chips used by a sulphite mill and digesting about 9 pounds of this material in a liquor containing 3 per cent of Na, of which 70 per cent was as NaOH, 20 per cent as Na_2S, and 10 per cent as Na_2CO_3. The material was cooked in a rotary digester for 1½ hours at 170 C., with the digester rotated intermittently to insure uniformity of temperature throughout the pulp and a minimum destruction of the fibers. After cooking, the pulp was cooled rapidly, washed, beaten for 10 minutes, and passed through a screen having a 0.4 mm. slots.

The total yield was 59.5 per cent of the weight of the wood on a dry basis, of which 57.8 per cent was fine stuff and 1.7 per cent coarse. The analysis is given in Table 4.

This "definitely unbleachable" pulp, containing 15.45 per cent of lignin, was bleached to an excellent white by a multi-stage process in which an acid solution of chlorite was used in the first stages and an alkaline solution of hypochlorite was used in the last stages.

Table 4—Analysis of Unbleached Pulp

	Per cent
Methanol-benzol extract	0.49
Lignin content	15.45
Alpha-cellulose content	95.30
Whiteness (Barium white, 100%)	19.12
Copper number	1.51
Methoxyl content	3.16
Lignin in alpha-cellulose residue	15.85

The details of this process were as follows, the percentages given being based on pure chemicals and referring to the weight of the pulp: The pulp, at a density of 3 per cent was treated for two hours at 70 C. with an 18 per cent solution of sodium chlorite containing 2 per cent of acetic acid, after which it was filtered and washed. This procedure was repeated three more times. Then, after the pulp at a density of 5 per cent was allowed to stand in a 1 per cent solution of NaOH for one hour, it was treated twice for five hours at 35 C. with an alkaline buffered solution of sodium hypochlorite containing 1 per cent of available chlorine the first time and 0.5 per cent of available chlorine the second time. Finally, after filtering and washing, the pulp was acidified with sulphur dioxide and washed.

The analysis of the resulting product is given in Table 5.

In these results, there is nothing to suggest destructive chemical action. On the other hand, the high values of the alpha-cellulose content, the specific viscosities, the pentosan-free alpha-cellulose yield, and the lowered copper number all indicate that there was no significant degradation and loss of polysaccharide substance.

A Pulp of Exceptional Strength—Physical tests showed that the strength characteristics of this bleached pulp were unusually high, exceeding, in fact, those of any other pulps the investigators had ever tested.

They explain this result by pointing out that, while unbleached sulphate pulp, as produced commercially, is normally stronger than unbleached sulphite pulp, the reverse is true when

Table 5—Analysis of Bleached Pulp

	Per cent
Yield (based on unbleached pulp)	78.6
Theoretical yield (from lignin content of unbleached pulp)	84.55
Whiteness	85.3
Alpha-cellulose	87.6
Furfural	6.72
Pentosan content of pulp (from furfural x 1.375)	9.24
Copper number	1.04
Ash	0.373
Furfural, from alpha-cellulose	1.99
Pentosan content of alpha residue	2.75

The *specific viscosities* of portions of the pulp nitrated to a nitrogen content of 13.07 per cent with the aid of phosphoric acid were 0.1173 for a 0.103 per cent solution and 0.4288 for a 0.300 per cent solution.

Polymerization-degree values, calculated from the viscosities by the rule of Staudiger, were 1035 and 1299, respectively.

The *pentosan-free alpha-cellulose yield*, calculated from the alpha-cellulose content and the pentosan-content of the alpha-cellulose, was 39.8 per cent of the weight of the wood, which is but little less than an accepted value of 41 per cent for beech wood.

Table 6—Comparative Physical Properties of Pulps

Kind of Pulp	Bb2	Bb3	K6	Gr2	U	C
Pulp slowness, deg. SR	50	50	50	50	50	59.5
Milling time, minutes	38	65	53	65	104	75
Breaking length, meters	8100	8885	8550	9150	8360	11,150
Stretch, per cent	3.61	3.68	3.78	3.96	3.35	3.85
Bursting strength, kilos per sq. cm	5.24	6.58	6.36	6.37	7.30	9.25
Tearing resistance, cm gr/cm	208.0	214.0	234.0	238.0	210.0	270.0
Double folds	3225	4625	4925	5050	2830	9250
Quality number, per cent	72.1	84.7	89.1	91.4	71.7	128.9
Whiteness, referred to barium white, per cent	82.4	83.1	84.5	83.3	19.1	85.3
Total quality number, per cent	59.40	70.39	75.29	76.14	13.7	109.95

Bb2—West coast American bleached sulphate pulp
Bb3—American bleached sulphate pulp
K6—Swedish bleached sulphate pulp
Gr2—Swedish bleached sulphate pulp
U—Unbleashed pulp prepared by the investigators
C—Same pulp, bleached with the aid or chlorite

both pulps are bleached to a high brightness. This is due to the fact that, when a high proportion of lignin is removed from sulphate pulp by bleaching it with chlorine or hypochlorite, the fibers are always attacked and weakened. Hence, by using the new bleaching agent, sodium chlorite, which destroys lignin without attacking the fibers, the production of a very strong pulp is possible.

Table 6 gives the physical properties of the unbleached and bleached pulp prepared by the investigators and, for comparison, of four commercial pulps. Comparison is aided by calculating a "quality number" and a "total quality number" for each pulp, by the method shown in Table 6.

It is evident from Table 6 that the chlorite-bleached pulp is far superior to the commercial pulps in all strength characteristics and is also stronger than the unbleached pulp, because of the removal of the lignin, which is always a source of weakness.

For further comparison, it may be mentioned that a sulphate pulp, bleached with special care in the Darmstadt laboratory with the aid of chlorine and hypochlorite, had a quality number of 100.6 and a total quality number of 88.43. These values are relatively high, but they are well below the corresponding values for the chlorite-bleached pulp.

The authors conclude that sodium chlorite bleaches wood pulp with no perceptible decomposition of the true cellulose substance and permits the production of the true cellulose substance and permits the production of pulps having hitherto unattained strength characteristics. Its development, they declare, represents an innovation of great importance to the pulp and paper industries.

References

1) Wenzl, Hermann. The use of sodium chloride in bleaching pulp. *Papier-Fabr.* 39, No. 30: 177-182 (1941).

2) Jayme, G. and Mo, S. The preparation of bleached sulphate pulp of maximum strength with sodium chlorite. *Papier-Fabr.* 39, No. 33: 193-199 (1941).

The Reciprocal Trade Agreement and You*

Paper is made in the same way in all papermaking countries of the world.

The trees are cut down and bucked into the proper lengths with the same tools and they are brought to the mills by the same methods of transportation.

The chippers, grinders, digesters, beaters, and paper machines are identical the world over.

Only standards of living and wages vary in the pulp and paper industry.

In the United States the rate of pay for the same kind of work is approximately three times that of Norway, Sweden, Finland or France.

The ocean freight rate from these countries to American ports is about the same or a little less than the railroad freight rate from Lake States mills to the Eastern seaboard.

Consequently, every other papermaking country is a lower cost producer than the United States, and can, therefore, sell its paper in this country at prices under those which the United States industry can afford.

Heretofore, this difference in price has been taken up, in whole or in part, by a tariff which permitted American papermakers to meet this foreign competition; but the Reciprocal Trade Agreements Act, recently passed by Congress, permits the President—which means the State Department—to cut the present tariff by 50 per cent.

If this cut is made, American papermakers will face even more severe foreign competition, and the amount of paper imported into this country will greatly increase.

On the average, every ton of paper imported deprives one American worker of three days' employment, but in the writing paper mills, one ton of paper represents a full week of work.

Any tariff reduction which increases imports thus results in an immediate proportionate idleness of American paper mill employees.

The United States experimented with reciprocity in 1911, and the United States newsprint industry in particular, and the entire industry in consequence, were the victims of that experiment.

When the United States made newsprint duty free as its part of a reciprocal trade agreement with Canada—an agreement which Canada failed to ratify—the newsprint industry moved to Canada.

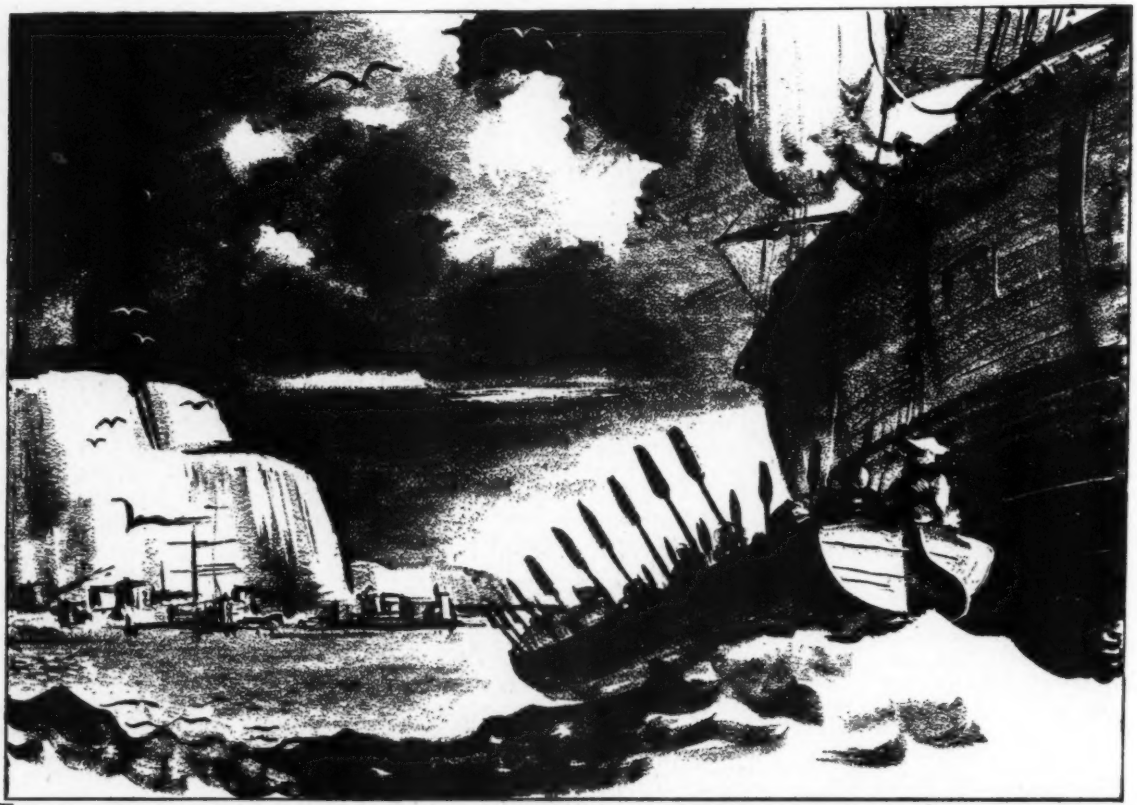
Since that time, American mills have been compelled to abandon that field, while it has had tremendous growth outside of the United States, principally in Canada, England and the Scandinavian countries.

Because of Canadian reciprocity, paper mills shut down, prosperous mill towns degenerated to crossroads and farm villages.

It has happened before—it can happen again.

*Released by the American Paper and Pulp Association.

Paper SKETCHES . . . . . .



THE MIGRATION OF FRENCH HUGUENOT PAPERMAKERS TO ENGLAND IN THE LATE 1600'S WAS INSTRUMENTAL IN SAVING BRITAIN £100,000 (APPROXIMATELY $500,000) YEARLY FOR PAPER PREVIOUSLY IMPORTED FROM FRANCE.

QUILTS MADE OF PERFORATED PAPER WERE POPULAR IN EUROPE DURING THE 1890'S.

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ACCORDING TO A RECENTLY PUBLISHED REPORT, ABOUT 70% OF THE WORLD'S ENTIRE SUPPLY OF PAPER IS BEING MADE AND CONSUMED IN THE UNITED STATES.

New

ELECTRONIC RESISTANCE THERMOMETER

for Pulp and Paper

THE BAILEY PYROTRON

As a resistance thermometer the Pyrotron indicates, records and controls temperatures between-100°F and 1200°F. It simultaneously records as many as four temperatures on its 12-inch chart, or may record and control as many as two temperatures.

An independent continuously connected measuring circuit serves each recording unit. These circuits are kept in continuous balance by sturdy motion-free electronic detectors which do away with the delicate parts and "step by step" action of galvanometer type instruments.

Indicating, recording and controlling instruments are furnished in rectangular casings as illustrated. Indicating and controlling instruments are furnished in 12-inch round type casings.

CHOICE OF THREE CONTROLS

Bailey Pyrotrons are furnished with the following types of Automatic Control:

1. AIR OPERATED—Uses standard Bailey Pilot Valves, air relays, control valves and control drives. Operates by compressed air at 35 lb. pressure.

2. ELECTRONIC—Uses standard electronic control panel operated from a control bridge in the Bailey Pyrotron.

3. ELECTRIC CONTACTS—Uses micro switches on slidewire unit or electronic relay operated from control bridge in the Bailey Pyrotron. P-5

UNUSUAL FEATURES OF THE BAILEY PYROTRON

Suitable for severe service where vibration and shock exist.

Measuring circuit operates from instrument power supply eliminating need for standard cell and dry battery.

Sturdy electronic system maintains continuous balance.

Motor drive furnishes abundant power to operate recorders, controllers and alarm switches.

Two recording controllers may be housed in one casing.

Electronic units may be interchanged without disturbing instrument calibration.

For details, request Bulletin 230-A "Bailey Pyrotron Electronic Resistance Thermometer".
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Controls for Processing

TEMPERATURE
PRESSURE
% OXYGEN
% COMBUSTIBLES
FLOW
LEVEL
DENSITY
RATIO

"Task Force" Meeting Replaces Superintendents Annual Convention

▶▶▶ A QUORUM MEETING of the American Pulp and Paper Mill Superintendents Association, Inc., was held on June 9, 1945, at the Hotel Commodore, New York City. The primary purpose of this meeting was to dissolve the Association as an Ohio corporation (as which it had been operating since its incorporation in 1932), and to re-incorporate as a New York corporation, and to transfer the assets of the Ohio corporation to the New York corporation.

In this business meeting, it was reported that the newly formed New York corporation will operate under the same name as formerly; and that a constitution very similar to the one used for the Ohio corporation has been adopted. The few changes made in the constitution were minor but were necessary to cover the changed location of its principal office and to provide for efficient operation under the new charter.

Raymond L. Barton, president of the Association, presided at this meeting.

After the reorganization proceedings were completed, there was an election of officers. Previous to the election, Niles M. Anderson, first vice president, submitted his resignation as one of the officers of the association because of the pressure of his regular work. His resignation was accepted with deepest regret.

Raymond L. Barton was re-elected president of the American Pulp and Paper Mill Superintendents Association for next year

In the election which followed, Raymond L. Barton was continued as president; each of the four remaining vice presidents was stepped up one place in rank; and a new name added as fifth vice president.

The officers for the coming year, therefore, are:

President—Raymond L. Barton, Michigan Paper Company, Plainwell, Michigan

First Vice President—Homer H. Latimer, The Champion Paper & Fibre Company, Hamilton Ohio

Second Vice President—Raymond F. Bennett, Ecusta Paper Corporation, Pisgah Forest, North Carolina

Third Vice President—Ollie W. Messner, Robertson Paper Box Company, Inc., Montville, Connecticut

Fourth Vice President—Charles H. Reese, Nekoosa-Edwards Paper Company, Port Edwards, Wisconsin

Fifth Vice President—James Fish, Paterson Parchment Paper Company, Bristol, Pennsylvania

Mr. Fish was the newcomer to the list of vice-presidential incumbents.

George W. Craigie also was re-elected as secretary-treasurer. His office is at 220 East 42nd Street, New York 17, N. Y.

During the progress of the meeting, Mr. Craigie read the names of members who had passed on since the meeting a year ago in Chicago. The necrology consisted of the following names: Albert Fish, Herbert E. Maul, George A. Thompson, William Rettig, Douglas E. Scott, Edward C. Rutz, Robert Caldwell, George W. P. Southworth, Courtney P. Winter, and Joe E. Talton.

A life membership in the Association was bestowed upon S. Avrid Salmonson, of Soundview Pulp Company, Everett, Washington.

It also was announced that the Association would conduct another Bolton Award Contest during the coming year. The contest subject will be chosen later.

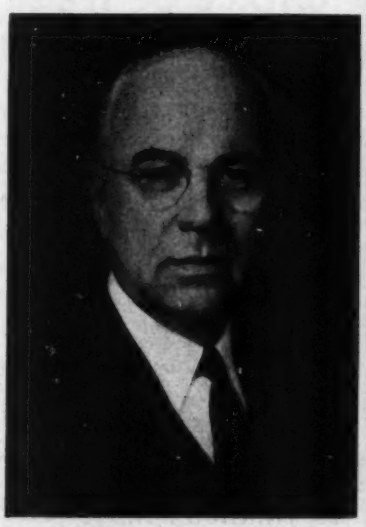
The divisional prize winners for the 1944-45 Bolton Award Contest have been awarded; and the ten prize winning articles are now in the hands of the national judges. As soon as the decision of these judges is made, the national winners will be announced and the Bolton Company will publish the divisional prize winners' articles in a book to be distributed to mill men throughout the country.

One of the highlights of the meeting was the President's message.

President's Message for 1945

At this time I wish to call to order the 1945 business meeting of our Association. This is the first year since the founding of our Association twenty-six years ago that an annual convention has not been held. I feel quite sure that all of you were fully in accord with the decision reached last March that, due to conditions confronting us, no other course was logical but to cancel all plans for a 1945 convention. However, it was decided that it was necessary to hold a business meeting this year such as is being held here today due to some changes in Association affairs which had been inaugurated sometime previous to the present day critical conditions, as well as to be absolutely certain to keep ourselves legal in a strict sense of the word.

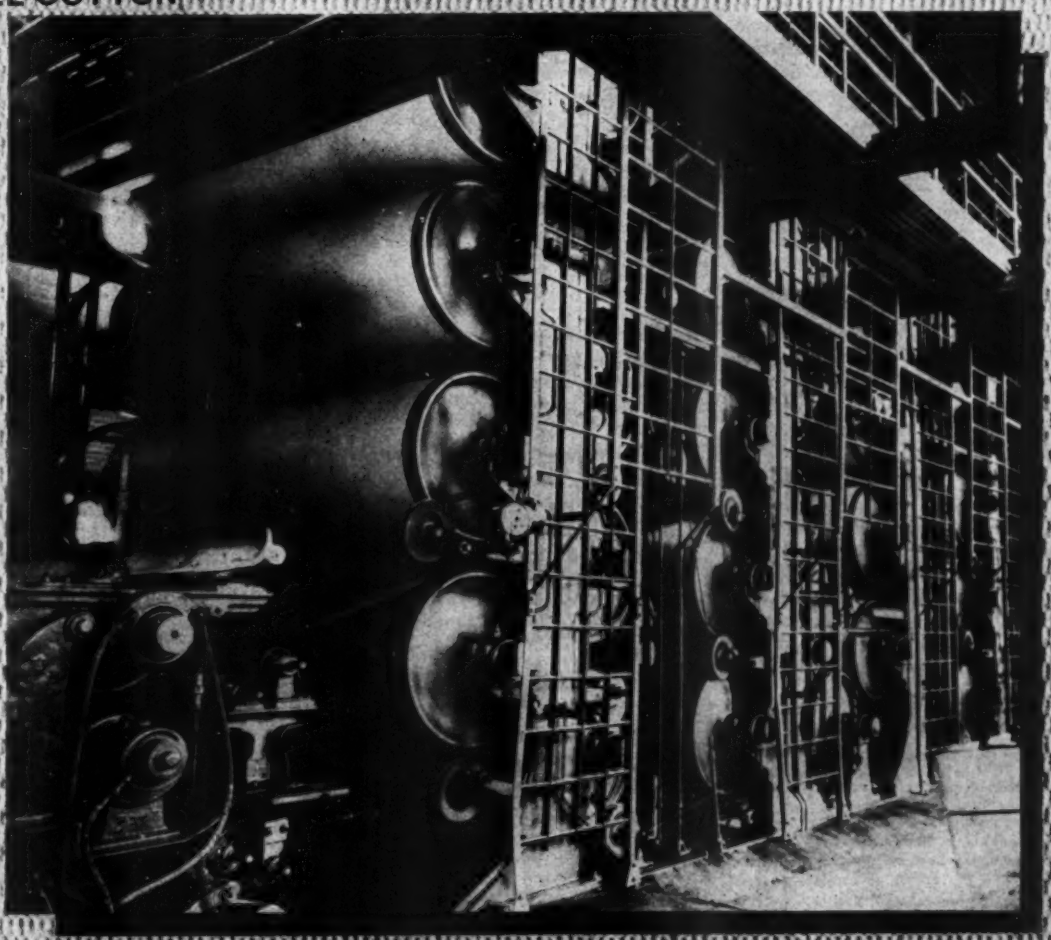
May I take this opportunity to pay tribute to the entire pulp and paper industry, of which all our members and Industrial Affiliate Members play such a prominent part, for the great part that it has played in helping to bring the great European conflict to what we now feel is such a successful close. We all know that our in-



George W. Craigie remains secretary-treasurer of the Superintendents Association for the coming year.

RICHLAND TRIPLEX ALL COTTON

ASSOCIATED WITH UNIFORM QUALITY FOR OVER HALF A CENTURY



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Economy in longer wear — in smoother operation through minimum stretch and shrinkage — in lower steam consumption through high porosity — all built into a highly uniform weave that provides smooth, long-wearing contact surfaces to produce consistently fine qualities of paper. Qualities you can depend on when you specify RICHLAND TRIPLEX all-cotton felts.

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dustry, and everyone in it, will still continue to carry on with all its efforts in the same manner until the War in the Pacific is also brought to a successful ending.

During the past year, which has been rather an unusual one in several ways in the life of our Association, your President has placed special emphasis in his efforts to promote activities that will provide and render greater service to our members. There can be no question but this must be one of the ever increasing functions of our officers and committees.

As was authorized to be done at the 1944 Convention we have this year established a New York office. I am happy to say that our office is one of which any Association should be very proud. I say this without any feeling of personal credit for the arrangement of and work done establishing the office was done by your secretary-treasurer, George W. Craigie. The establishing of this office has already proven of great benefit to our Association and indications are that future benefits will prove so great that I hesitate to attempt to stress upon these at this time. I do wish to tell you that it has already made possible many things that are of the utmost importance to us that could not have been accomplished otherwise, which in the end means greater service rendered to all our members.

The divisional meetings during the past year were of the very highest standard and as these divisional meetings are a most integral part of our organization it is most essential that they be continued, even if necessary to do so on a restricted basis.

The various committees have been very active even though it has not been necessary for them to make preparations for programs for our Annual Convention. Their activity and spirit of co-operation may very well be shown by the fact that they are going to provide a good share of the material for the 1945 Year Book which will be published this year as usual.

During the past year our Association in co-operation with John W. Bolton & Sons Inc., sponsored the "Bolton Award Contest." This is the first attempt by our Association to undertake the handling of a project of this nature. Your committee and Bolton's representatives devoted a great deal of time to setting up the rules of this contest and selecting the topics on which it was to be based. They finally selected topics related to the field that are possibly of the greatest interest to us today; namely, those in the field of labor. When ten winning papers in this contest are assembled in book form, and copies of these placed in your hands, you will find that the information contained therein will prove of the utmost value to each and every one of us.

A year ago in Chicago, committees were appointed and work started on a project to be known as the "Chemical Booklet Project." The accumulation of all the data for this booklet is now complete and about ready to be placed in the hands of the printer. When you receive your copy of this Chemical Booklet we feel that you are going to recognize this as one of the best jobs we have ever done and will realize the great work that can be accomplished by a committee composed of Association Members and Industrial Affiliate Members working together.

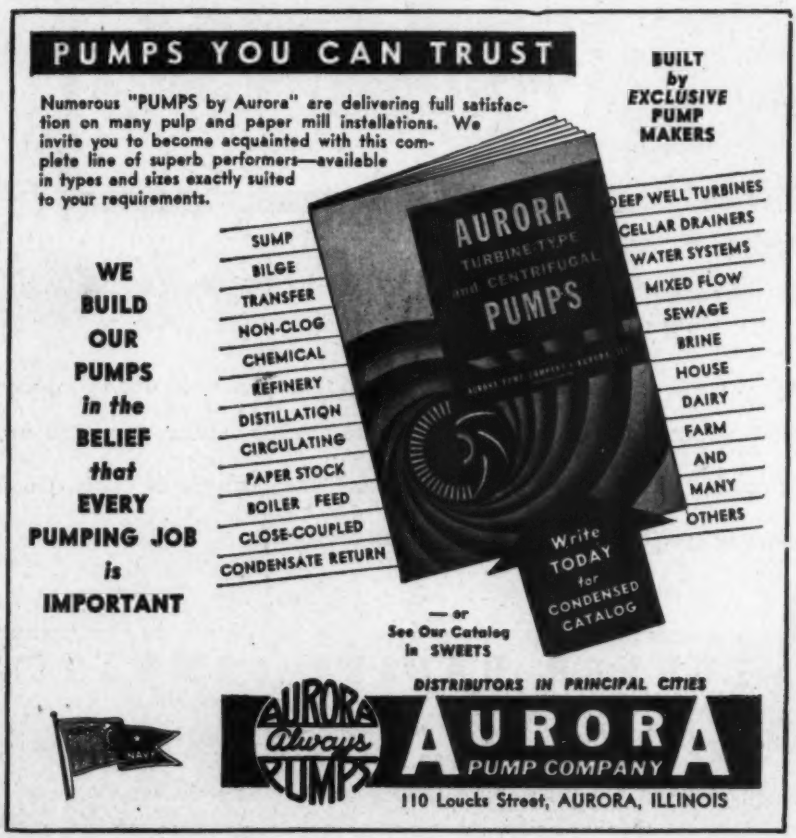
I have mentioned two specific illustrations of the spirit of co-operation that exists between our Association and our Industrial Affiliates, but I wish to dwell just a moment longer on this. I sincerely feel that there are great opportunities ahead in what may be accomplished by the carrying on of projects by our joint Committees and I respectfully urge that this work be carried on with increased vigor.

When you paid me the great honor of selecting me to serve as your President I knew that the duties in connection with this office were very great. I have found them to be even greater than I expected and I could not have carried on, even as well as I have, without the support and co-operation of everyone, and I wish to express my most sincere thanks to George W. Craigie for his untiring efforts in our behalf this year.

One most important point stands out in my mind. That is, no matter what, or how much, or how little, I have contributed to the welfare of our Association while serving you as President, the benefits I have obtained in return far outshadow anything that I may have accomplished. I also fully realize that I have made mistakes, but I sincerely trust that these have been mistakes of omission rather than commission, and hope that you will not judge me too harshly for these in the years to come.

The *Paper Mill News*, our official organ, and all our good friends in this publication, deserve a most sincere vote of thanks for the most efficient manner in which it has brought us the news.

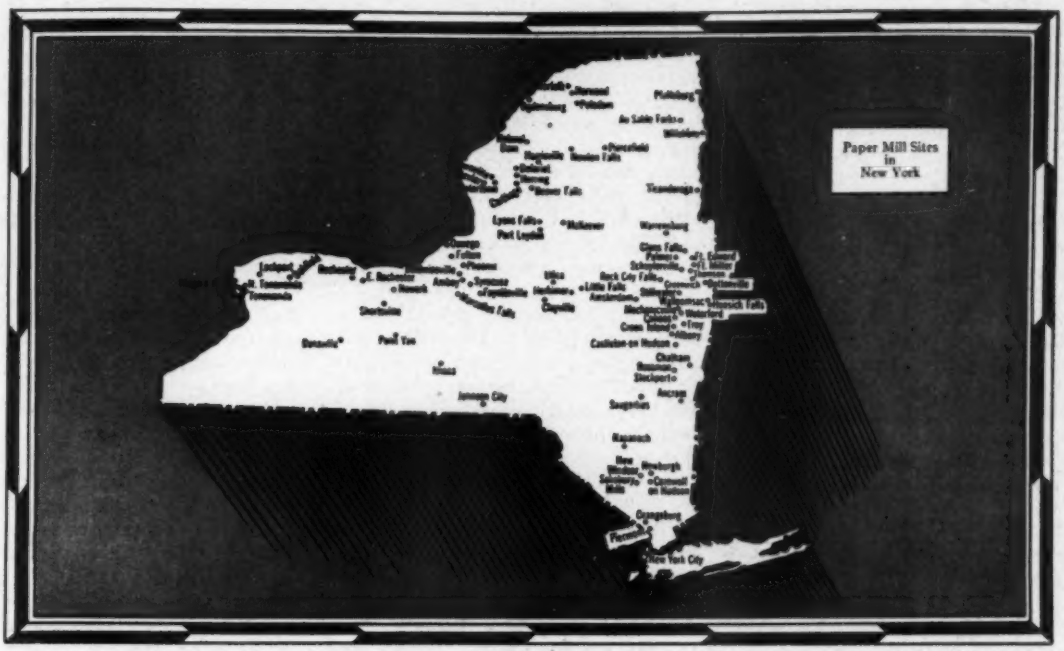
May I take this opportunity to thank our parent association, The American Pulp and Paper Association and its secretary, E. W. Tinker, for



Draper's

ATLAS OF AMERICAN PAPERMAKING

No. 7 PUBLISHED BY DRAPER BROTHERS COMPANY • CANTON, MASSACHUSETTS



Map Copyright by L. D. Post, Inc., New York. American Map Co., N. Y.

HIGH LIGHTS: The foundation stones of Henry Onderdonk's property on Sliver Lake, near Hempstead Harbor, Long Island, are all that remain of New York's first paper mill. A marker should be placed on the spot dated 1773. It might also state — "George Washington made paper here on April 24, 1790."

The Father of his Country, thus unwittingly commemorated the 100th anniversary of American papermaking. He was sufficiently impressed to record in his diary that he was "kindly entertained" at breakfast by Mr. Onderdonk, who "works a grist mill and two paper mills, the last of which he seems to carry on with spirit and profit." Unfortunately the cherished sheets which Washington made have been lost.

The progress of papermaking in New York, following its watercourses, spread all over the eastern and northerly parts of the State. Its products exceed those of all the earlier pioneers, and none have yet surpassed New York in the production of paper, although Maine, Washington and Wisconsin, in the order named, produce more wood pulp.

The Department of Pulp & Paper Manufacture of the New York State College of Forestry on the campus of Syracuse University, established 1918, was the second institution of technical education for this purpose in the United States.

New York produces about one and one-half million tons of paper annually on the following equipment: 122 paper mills and 30 pulp mills. 115 cylinder machines, 108 Fourdriniers, 12 Yankees, 133 wet machines.

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the interest they have shown in us and our activities.

Also may I pay my respects to the sound judgment and ability of the founders of our Association and by so doing call your attention to the word which forms the base of our emblem "Confidence." This word has always carried a large meaning but it seems that it means even more today than it ever has. So let us face the future with "Confidence," in ourselves, our Association, and our Industry.

With your kind permission I am going to close this message with a request. The request is that all of you continue to give all future Presidents the same good counsel, assistance, and moral support that you have given me during the past year, and if you do, I am sure that our Association can continue on to greater heights of achievement.

▶▶▶ On the day before the business session, the Association held its annual Trustees meeting.

Among other incidents of the two-day conclave that should be stressed is a chemical book project. John Cornell, *Paper Mill News*, as secretary of the Affiliates Committee, reported for that Committee on the progress being made on the project. It was brought out that this book, shortly to be published, will list more than 600 chemicals used in the manufacture of paper. It will be a convenient handbook for superintendents and other mill officials.

The Association, according to reports, has a number of new projects under way and announcements regarding them will be made from time to time during the year.

This "task force" meeting of the American Pulp and Paper Mill Superintendents Association, required because of wartime travel restrictions, accomplished much more than mere numbers present would indicate. There was a job to do and it was done.

Today, the Association has more than 1,000 members in more than 400 mills throughout the United States, Canada, and other parts of the world.

◆

AMERICAN STANDARDS ASS'N HAS NEW LIST OF STANDARDS

A new list of all American Standards and War Standards approved to date has just been published by the American Standards Association and is available free of charge.

There are approximately 800 standards listed in the booklet, covering specifications for materials, methods of tests, dimensions, definitions of technical terms, proceedures, etc. Included is the safety code for paper and pulp mills.

Canadian Technical Section Holds Summer Meeting

▶▶▶ A FULL AND VARIED program and individually well attended meetings epitomizes the 1945 Summer Meeting of the Technical Section of the Canadian Pulp and Paper Association that was held at the Chateau Frontenac, in the city of Quebec, on June 18, 19, and 20, 1945.

According to Dr. A. C. Hill, chairman of the Technical Section, the meeting broke all previous attendance records of summer meetings of the organization. Dr. Hill also stated that the Technical Section had 335 members in 1931; that up to 1941, there had been no net increase in members; and that since 1941 the membership of the Section now has grown to 630 members.

Much credit for the growth of the Section, according to Dr. Hill, is due to Douglas Jones,, secretary-engineer of the Technical Section. Dr. Hill also announced the appointment of John Evans as technical assistant to the secretary-treasurer.

At the official dinner meeting, held on the evening of June 19, Dr. John S. Bates (manager, Price & Pierce, Ltd.), the first chairman of the Technical Section (1915-1918), was presented with an Honorary Life Membership in the Technical Section. Also at that meeting, R. M. Fowler, recently appointed president of the Canadian Pulp and Paper Association, was guest speaker.

Dr. Hill presented Dr. Bates with the Honorary Life Membership certificate; while R. L. Weldon, president, Bathurst Power & Paper Corp., Ltd., introduced Mr. Fowler.

In accepting the Honorary Life Membership certificate, Dr. Bates reminded all members of their responsibility in the development of the Section; gave recognition to the splendid work of the Pulp and Paper Research Institute at Montreal; related that there will be improvement of equipment and processes and in forest policies; and indicated a closer partnership between industry and government. He added that the pulp and paper industry is a good example of democracy at work.

In concluding his remarks, Dr. Bates suggested the need for more realism on the part of some of the members of the Association; and pleaded for faith in research.

Mr. Fowler related some of his impressions of the pulp and paper industry of Canada formed from a comparatively short association with it.

He said that the sweep and scope of the industry amazed him; that the story of the industry is bigger and more vital than can be obtained from dull statistics; that the industry is a very major slice of Canada. He also expressed amazement at the amount of individual effort that goes into the industry.

Mr. Fowler warned that technical men needed to be more than technical men. He added that they should be advocates of their ideas, and that they must bring their ideas with persuasion and understanding to the attention of the men who must decide. In addition, he suggested that technical men must understand the doubts and difficulties of the men they are trying to convince.

Mr. Fowler recalled the amazing technical development of the past four or five years, and prophesied that the present high demand for pulp and paper likely will continue for the next few years. These years, in the opinion of Mr. Fowler, will be years of golden opportunity for technical men and women.

He cautioned against the inclination to let down, and the feeling that the end of hostilities will see the end of problems. He said that some of the old problems would contniue and that some new difficulties would arise. Now is the time, commented Mr. Fowler, to catch a second wind and to redouble the effort.

Mr. Fowler made reference to the difficulties, setbacks, and uncertainties of the San Francisco Conference and related that if we cannot learn to co-operate in a smaller sphere, what hope is there in the wider field. The forces that drive men apart or together, continued Mr. Fowler, are always at work.

There must be competition and individual initiative, he added. In conclusion, he said that all go up or all go down together.

The morning of June 18 was given over to registration; the afternoon, to group meetings, as were both the morning and afternoon sessions of June 19.

The group meetings of the first afternoon included the following: Board Committee, Fine Papers Committee, Heat and Power Committee,

SPECIFY "GENERAL CHEMICAL"

for effective pH control and maximum sizing

GENERAL CHEMICAL COMPANY products for the Paper Industry

Aluminum Sulfate (Standard and Iron Free) • Copper Sulfate • Muriatic Acid (Hydrochloric) • Sodium Fluoride • Sodium Silicate • Sodium Metasilicate • Glauber's Salt (Crystal or Anhydrous) • Salt Cake • Sodium Sulfide • Sodium Hyposulfite • Sodium Sulfite (Anhydrous) • Sodium Bisulfite (Solution or Anhydrous) • Disodium Phosphate • Trisodium Phosphate • Tetrasodium Pyrophosphate • Sulfuric Acid • Nitre Cake (Sodium Bisulfate) • Nitric Acid

TODAY more than ever, paper makers are insisting on General Chemical "Alum" in their operations because they can rely on its uniformity for maximum sizing and desired pH.

Careful attention to all production details plus constant laboratory control make General Chemical Aluminum Sulfate a product of high quality in its various grades. Specify "General" for your quality paper-making chemicals!

[redacted]

Standard—Lump; Ground 99% thru 8 mesh, 95% thru 10 mesh; Powdered 95% thru 100 mesh.

Iron Free—Lump approx. 2½"; Ground thru 8 mesh.

[redacted]

Solutions: from 38°—60° Baume. Wt. Ratio (Na_2O to SiO_2) from 1:2.00—1:3.40.

Appearance: Opalescent to clear.

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In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

Newsprint Committee, and Sulphite Committee.

On the morning of June 19, the following committees met in individual group meetings: Engineering, Groundwood, Waste, and Wood Chemistry.

The afternoon of June 19 was given over to meetings of the Alkaline Pulping Committee, Board Committee, Fine Papers Committee, Printability Committee, and Sulphite Committee.

Numerous questions, prepared in advance, offered plenty of discussion material for the two meetings of the Board Committee. These questions related to stock preparation, wet end of machine, dry end of machine, sizing, calendering, and drying.

Here are just a few of the questions:

Is the stock loss resulting from unbeaten waste paper becoming entrained in the rope of rejects from a Hydrapulper excessive?

What are the average vat temperatures for any one grade of board?

What is the optimum temperature for running?

What are the effects of too high or too low a temperature?

In what parts of the system are foam killers added? At what rate are they added?

How effective in reducing foam are the various foam killers used?

How much make-up water per ton is used to replace white water losses?

What is the minimum vacuum usually carried on flat boxes? This is based on machine speed of 250 feet per minute.

What is the optimum size, diameter and face of primary rolls and how many produce the most advantageous effect?

(a) With suction extractor equipment

(b) Without suction extractor equipment

Are there any advantages in using cylinders larger than 36 inch diameter on the ordinary multi-cylinder machine? How are the disadvantages, such as stock slippage, overcome?

What savings can be effected by installation of a suction drum press?

Has there been any experience with the use of stainless steel slice boards on baby presses?

What is the best hardness (P & J) for:

(a) extractor roll couches?

(b) cylinder couches?

What non-metallic materials are being now used for press roll doctors?

What are the densities of rubber couch, primary and press rolls?

What has been the experience of members with single cylinder facings?

Are vacuum couches used in the first press position on cylinder board machines? If so, what is the minimum vacuum normally carried?

Are there any mills operating variable speed vacuum pumps on second and third press positions?

What is the average plastometer of rubber baby press rolls?

Does driving top press roll baby presses lengthen life of bottom felt and what type of drive recommended?

Have any mills installed a suction drum after last cylinder? What is their experience, as to water removal, felt life, bulk and mark in sheet?

Are save-alls used to recover losses from white water? What is considered good operating for white water losses; methods, if any, to recover fiber and filler?

Are consistency regulators used? At what position? Do they improve operating conditions?

What is the best type of cutter draw roll, felt, plain rubber or wormed rubber?

What are the mills doing to counteract the reduction in rosin size consumption necessitated by the shortage of rosin?

Is there any known method for evaluation of "Foam Killers"?

Has anyone experience with Bituman type sizes? How do they compare in dollar value with resin and wax sizes? Do they reduce foaming and so improve formation and strength characteristics?

Is there any satisfactory mechanical method of feeding board mill calendar stacks?

What is the maximum thickness of film applied at the calendar stacks, how many applications are necessary to obtain this?

Which temperature stages in the dryer section offers the most advantages viewed from:

(a) Economical operation,

(b) Finish effect of the sheet,

(c) Versatility on range of grades and weights that can be dried?

Should folding board be dried with gradually increasing temperature to the dry end? Is this true also of set up board or should it receive harder drying at the wet end?

Does drying efficiency drop on a machine beyond certain speeds?

Is tonnage dried, effected by the weight of board being run?

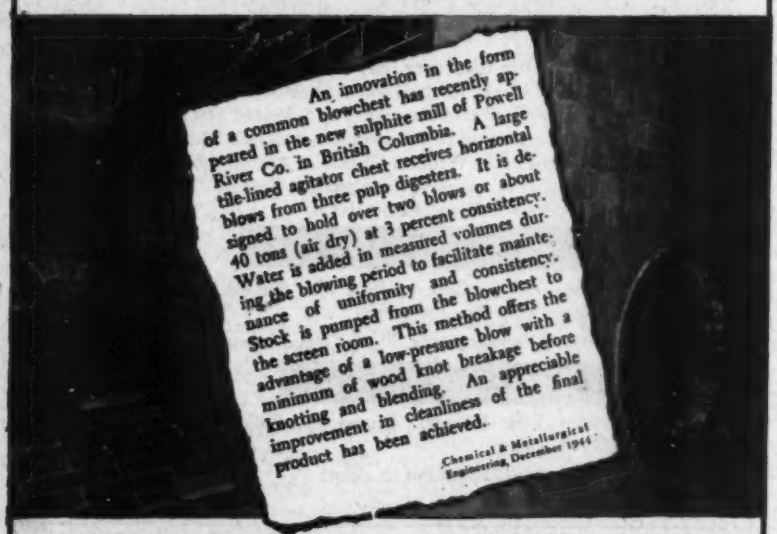
Has fast runnnig lightweight board produced higher drying efficiency than slow running heavyweight board?

What is the relationship between dryer face and drying capacity?

What success has been had with putting rings on dryers to increase trim?

What auxiliary drying systems are in use and what increase in production

The "Innovation" was *STEBBINS LINED*


An innovation in the form of a common blowchest has recently appeared in the new sulphite mill of Powell River Co. in British Columbia. A large tile-lined agitator chest receives horizontal blows from three pulp digesters. It is designed to hold over two blows or about 40 tons (air dry) at 3 percent consistency. Water is added in measured volumes during the blowing period to facilitate maintenance of uniformity and consistency. Stock is pumped from the blowchest to the screen room. This method offers the advantage of a low-pressure blow with a minimum of wood knot breakage before knotting and blending. An appreciable improvement in cleanliness of the final product has been achieved.
Chemical & Metallurgical Engineering, December 1944

FOR sixty-one years, Stebbins lining "know-how" has been active in making "innovations" work successfully. On your next lining or tank job, call in Stebbins.

Stebbins Engineering and Manufacturing Company
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ONE *recognized standard*

THE COTTRELL PROCESS OF ELECTRICAL PRECIPITATION

FOR GAS CLEANING, smoke abatement and removal of dust, fume, tar and other suspended matter from gas, there has been one universally accepted process for more than thirty years. In answer to your special problem, a Cottrell installation incorporating this rich experience in research, development and worldwide operation means the complete fulfillment of your requirements.

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can be expected by the installation of such a system?

How can one check the efficiency of the dryer syphon?

The Fine Papers Committee meeting had for its subject of discussion—Machine Wire and Felt Life; The Heat and Power Committee, Bark Burning; the Newsprint Committee—Press Rolls and Press Roll Crowns.

Three papers were presented before the Sulphite Committee meeting of June 18; two papers, before the meeting of June 19.

The subjects of these papers and their contributors were as follows:

"Gas Reclaiming and Acid Fortification," J. C. Benny, Gaspesia Sulphite Co., Ltd.; "Pulp Bleaching," C. T. Clark, Restigouche Company, Ltd.; "Cooking hardwoods," R. A. Webber, Brown Company; "Sulphite Pulp Quality," S. E. Ekman, Rhinelander Paper Company; and "Market Trends of Bleached and Unbleached Sulphite," Miss M. Mathews, Montmorency Paper Company.

"Maintenance of Steel Tanks," by L. C. McMurtrie, Horton Steel Works, was a paper on the program of the Engineering Committee meeting. Also at this session, two films were shown. The films depicted "Oxy-Acetylene Flame Priming" and arrangements for their showing were made through the courtesy of Dominion Oxygen Co., Ltd.

The major subject of the Groundwood Committee meeting was bleaching of groundwood. The papers on the program included: "The Zinc Hydrosulphite Process" by I. H. Andrews, Powell River Co., Ltd.; and "The Sodium Peroxide Process," by Dr. J. Reichert, E. I. du Pont de Nemours & Co., Inc.

Utilization of Wood Waste (Review of Program) was the general over-all topic of the Waste Committee meeting.

Four papers were scheduled on the program of the Wood Chemistry committee meeting. These papers were: "The Structure and Physical characteristics of Bark," J. Hale, Forest Products Laboratories (Ottawa); "The Chemical Constituents of Bark," Dr. H. Schwarz, Forest Products Laboratories (Ottawa); "The Chemistry and Utilization of Bark," Dr. C. B. Purves, McGill University; and "The Chemistry and Utilization of Wood," Dr. J. Risi, Laval University.

A paper on "Brown Stock Washing," by J. Grieve, Brown Corporation was on the program of the Alkaline Committee meeting; while "The Physics of Newsprint—Printability," spearheaded by Dr. W. Boyd Campbell, Pulp and Paper Research Institute of Canada demanded the attention of the meeting of the Printability Committee.

A round table discussion with representatives of the Royal Canadian Mounted Police on problems confronting in that organization made up the program of the Fine Papers Committee meeting.

▶▶▶ The morning of June 20 was given over to mill visits. Arrangements for these visits were in charge of the local Quebec Committee. The mills listed for visitation included Anglo-Canadian Pulp and Paper Mills, Ltd., Quebec; Building Products, Ltd., Pont Rouge; Donnacona Paper Company, Ltd., Donnacona; and St. Anne Paper Company, Ltd., Beaupre.

The members of the Local Quebec Committee were: E. D. Hyndman, Anglo-Canadian Pulp and Paper Mills, Ltd., Chairman; G. F. Layne, Price Bros. & Co., Ltd.; G. E. Shipman, Donnacona Paper Co., Ltd.; J. W. Church, Building Products, Ltd.; F. W. McBride, St. Anne Paper Co., Ltd.; and W. E. Soles, Anglo-Canadian Pulp and Paper Mills, Ltd.

This same committee was in charge of arrangements for the golf tournament which concluded the three-day meeting on the afternoon of June 20. The tournament was held at the Royal Quebec Golf Club, Boischatel. Competition was for the R. A. McInnis Trophy.

◆

KALAMAZOO VALLEY SECTION OF TAPPI ELECTS OFFICERS

The Kalamazoo Valley Section of TAPPI held the final meeting of the season on June 15. This event was marked by a golf outing and dinner, also the election of officers for the coming year.

R. C. Germanson

R. C. Germanson, chemist with the Kalamazoo Vegetable Parchment Company, was elected president. B. E. Freeman, Sutherland Paper Company, was made vice president; R. T. Mashburn, Hercules Powder Company, was named secretary; and Lee Mimms, Kalamazoo Paper Company, was elected treasurer.

◆

LAST MEETING OF SEASON FOR CHICAGO PAPER GROUP

The Chicago Professional Paper Group closed its present season of meetings on the evening of June 18. The principal speaker was D. Clark Everest, president and general manager of the Marathon Corporation. Mr. Everest's subject was "Review and Preview of the Paper Industry." His talk, filled with a wealth of statistical information, was enjoyed by a splendid audience. (*Complete text of Mr. Everest's address appears elsewhere in this issue.*)

The season has been an unusually successful one. All meetings have been well-attended and the programs have been quite varied.

Plans are now under way for the third season of the organization which will begin this coming fall.

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We also manufacture cutting cylinders, anvil rolls, and squeeze rolls. We make a specially constructed steam jacketed 2" and 3" pump for handling viscous materials such as filled asphalt, heavy lubricating oils, and kindred products.

Pump catalogue upon request.

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F. C. HUYCK & SONS MARK 75TH ANNIVERSARY

The firm of F. C. Huyck & Sons, of Albany, New York, is this year rounding out three-quarters of a century in the manufacture of papermakers' felts.

Founded in 1870, shortly after the introduction of the woodpulp process had given papermaking a great impetus in America, the Huyck business has grown steadily in volume.

Since the beginning of the present war, the Huyck organization has worked closely with paper manufacturers, helping the industry in making its great and dramatic contribution to the fight for victory.

Long before the prospect of war loomed, the company had established research laboratories as a service to the paper industry. The revolutionary new uses found for paper required the designing of special felts for their production, for no adage in the paper industry is truer than that "Every paper problem is a felt problem."

The Huyck business was started in an old woolen mill in the tiny village of Rensselaerville, New York, twenty miles from the nearest railroad. The making of papermakers' felts was then just beginning in America. Although there were several hundred paper mills in the United States, previously, all felts had been imported from England.

Francis Conkling Huyck, still a young man, was quick to realize the possibilities in the felt-making business. The original difficulties were many . . . remote location, a help shortage, and the trials of introducing a new product. The felts, after weaving, had to be taken to women of the countryside to be joined, after which they were returned to the mill for washing, fulling and finishing.

In his determination to make the best felts possible, Mr. Huyck visited England, studied traditional British methods of felt-weaving and brought experienced supervisors and expert workmen to America. A larger mill building was leased at Kenwood, on the outskirts of Albany, and the most modern machines then available were installed. Mr. Huyck made contacts with British wool sources; even began experiments in humidifying, to duplicate here the climatic conditions of England, so favorable to felt-making.

The next fifteen years saw many changes. Presses became wider, necessitating wider felts and wider looms for weaving them. The speed of paper machines increased, requiring improvements in the felts to meet the more severe conditions.

In 1894, the mill at Kenwood was destroyed by fire and the business was then moved to Rensselaer, New York, but the name of Kenwood Mills was retained.

The speed of papermaking machines increased steadily and better and better felts were needed to keep pace with them. Mr. Huyck secured the exclusive United States rights for a loom making seamless felts, which eliminated the danger of the seam giving way when the felt was stretched tight on a high-speed machine.

With the tremendous consumption of woodpulp and the growing scarcity of it in this country, many paper mills were located in Canada, close to the great spruce forests. To serve them more efficiently, a new Huyck felt mill was established at Arnprior in Ontario, in 1918, to produce felts to meet the special requirements of the Canadian paper industry and to conduct export business to most of the papermaking countries of the world.

With each new development in the field of papermaking F. C. Huyck & Sons has continued to render a co-operating service to the industry, and as wartime discoveries are applied to postwar use, this service will be continued as it has for the past 75 years.

RESULTS OF NATION-WIDE POLL CONDUCTED BY THE BULKLEY, DUNTON ORGAN.

A nation-wide poll conducted by the Bulkley, Dunton Organization reveals that paper and board manufacturers and large users of the industry's products are overwhelmingly in favor of adopting the proposed simplified standard base for all paper and board. Less than ⅓ of 1 per cent of the 1,500 printers, publishers, converters and other large consumers, and less than 1 per cent of the 700 paper and board manufacturers questioned have expressed their desire to retain the present impractical method of measuring paper and board.

Although several progressive leaders of the paper and graphic arts industry have repeatedly urged the adoption of a uniform standard base, a small but articulate group of opponents has so far been successful in keeping the antiquated system alive. The vast majority of votes in favor of simplification, and the almost complete lack of serious opposition shown in the present poll, appear to indicate, however, that some of the former opponents of simplification have changed their attitude about the issue. Observers believe that this may be due to two separate but interdependent factors. One factor is that the present time, with catalogues and sales promotion material largely outdated and with impending changes in personnel due to returning veterans, constitutes an excellent, and perhaps never recurring opportunity for the change-over. The other factor is that the overwhelming and ever-growing majority favoring simplification makes it obvious to even the staunchest opponents that the change is inevitable and bound to come sooner or later. With the present circumstances so favorable, and with simplification just being a matter of time, some former opponents are believed to have swung over and now urge immediate action to accomplish the change. It is evident that adopting the uniform standard base at this time would cause far less trouble, consume much less time, and cost much less money than it would later when the industry's activities are expected to run in normal channels again.

Bulkley, Dunton undertook the poll as a result of a flood of approving and encouraging letters from industry leaders following some articles on base simplification by George G. Cobean, president of Bulkley, Dunton Paper Company, S.A., the paper export unit of the organization. In these articles Mr. Cobean has marshaled a number of logical and incontrovertible arguments in favor of the uniform standard for all paper and board based on the decimal system. The proposed simplification does not involve changes in the present sizes and weights of paper and paperboard. It merely provides for a simple method whereby the basis weight of all types of paper and board is expressed in terms of 1,000 sheets of 1,000 square inches each. Since 1,000 is a decimal figure, it is infinitely easier to compute sizes and weights on that basis. The board industry is now operating on this system, but as it consumes large quantities of paper it would be very much in its interest if the same uniform base would be adopted in the paper industry.

Results of the poll to which hundreds of manufacturers and users, including some of the largest producers and consumers of paper and board, have responded, appear to indicate that the sentiment within the industry for simplification exists to such a large degree as to almost permit the use of the word "undivided."

In gauging the potentialities of your future Far West operations . . .

count on Columbia for Alkalies

THROUGH recently acquired Pacific Coast facilities, Columbia brings to the great far west area the efficient and economical production of basic chemicals so beneficial to the entire industrial economy.

The rich alkali deposits at Owens Lake, California—consisting principally of Soda Ash, Borax and Sesqui-Carbonates—are an important addition to other Columbia resources. Their acquisition is characteristic of the progressive policy which seeks to anticipate the growing requirements of customers to the greatest extent possible.

For complete information on our ability to serve your operations in the far west—present or contemplated—you are invited to consult our General Offices, or the most conveniently located District Office.

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PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
GRANT BUILDING • PITTSBURGH 19, PA.

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On the ballots sent to industry executives it was clearly specified that it was not necessary to sign their names and that they may return the ballot by merely marking it for or against. Despite this fact, less than 2 per cent of the ballots were returned unsigned and a great many company officials gave emphasis to their vote by additional remarks. Most of these remarks not only expressed pledges of wholehearted support for simplification, but unmistakably reflect the industry's desire for immediate action. As if answering the few who appear to exaggerate the difficulty of re-education, the head of a large concern wrote on his ballot: "any man who is bright enough to master the old system, would certainly require no re-education to learn the new base."

◆

THREE TIMKEN OFFICIALS ARE ON A MISSION TO MOSCOW

Three officials of The Timken Roller Bearing Company, headed by William E. Umstattd, president, left Canton (Ohio) Friday, June 15, for a business trip to Moscow. Mr. Umstattd is accompanied by A. L. Bergstrom, vice president in charge of engineering, and O. J. Horger, chief engineer of the railway division.

Before leaving, Mr. Umstattd stated the trip had two purposes: First, interesting the Soviet government in using Timken tapered roller bearings in a complete revamping of the Russian railway system. Second, offering technical assistance in a plan to manufacture roller bearings.

The three men expect to remain in Russia for 10 to 12 days. On the return trip, Mr. Umstattd will stop off to inspect Timken plants in France and Great Britain. While in Moscow, the three men expected to have a conference on Russia's railway transport problems and needs with Commissar Kagonovich, who is in charge of the Soviet transport system.

◆

DOW CHEM. COMPANY'S ST. LOUIS OFFICES SET TREND IN NEW DESIGN

The new offices of the Dow Chemical Company in St. Louis, Missouri, are considered unique, and it has been said that the unique decoration of these offices may set an entirely new trend in business office design.

Leland I. Doan, vice president and general sales manager of Dow, calls color and light two of industry's greatest untapped assets. The offices which occupy the entire eighteenth floor of the Continental Building, represent one of the first scientific applications of color and functional design solely from the standpoint of their physiological and psychological effect upon personnel and visitors. Brilliant colors have been used in abundance. Ceilings vary from 7 feet 4 inches to 10 feet, and unusual spaciousness has been achieved through the liberal use of glass panels. Some solid wall partitions are completely covered with mirrors.

Because of the interest in the novel idea, the offices were opened to public inspection one day in June.

◆

BROAD PLAN FOR VETERAN RE-EMPLOYMENT ANNOUNCED BY STANDARD OIL (IND.)

In a letter addressed to 3,550 employees of Standard Oil Company (Indiana) still in the Armed Services and Merchant Marine, Robert E. Wilson, chairman of the board, and A. W. Peake, president, will assure them jobs on their return and benefits over and above those ordered by veterans' legislation.

Among the points of a detailed re-employment plan approved by the company's board of directors are the following:

1. All who were regular employees will, as a minimum, be restored to the positions in which they last worked on a regular basis or to positions of the same relative standing. Under certain conditions they will get better jobs and pay.

2. Those who may be unable to resume their previous work because of war disability will be offered other positions which they can be trained to fill. No veteran will be refused employment because of disability if a job can be found which he can perform without creating a safety hazard.

3. While legislation makes no provision for employees leaving temporary positions every effort will be made to place former temporary employees also.

4. Time spent in war service is to be counted as time worked for the company in computing company service.

5. Pay will start the day the veteran reports, if he goes to work the following day.

6. Regardless of when the veteran returns, he will become eligible for vacation on the same basis as if he had not been away.

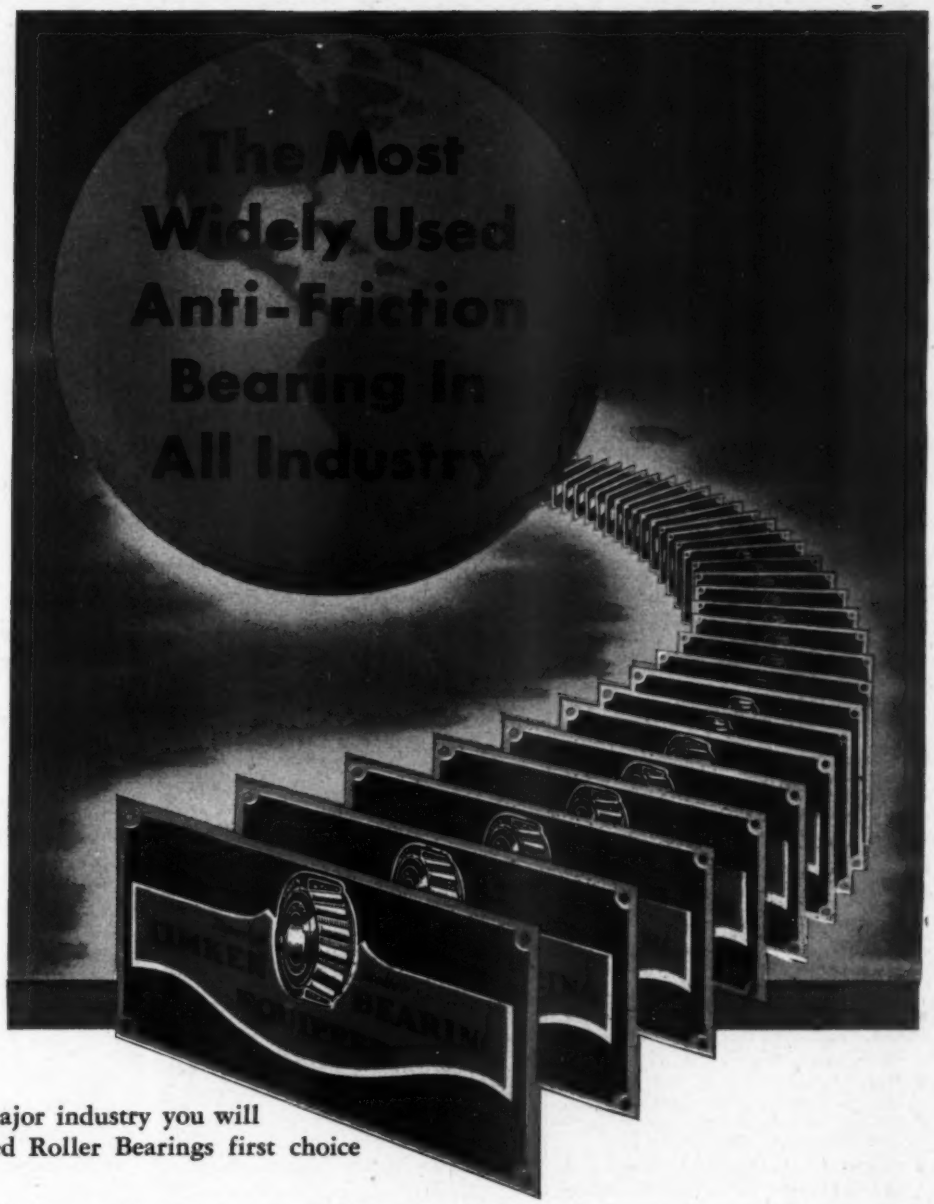
7. Full resumption of eligibility to benefits of company welfare plans is assured.

8. Special consideration will be given in individual cases wherever and whenever necessary.

9. The majority will receive not only the one month's pay granted on entry into service but also a second month's pay on returning.

10. While the welcome home will be hearty and sincere, veterans will not be embarrassed by elaborate receptions or "re-orientation" programs.

Timken officials who are in Moscow on business: Wm. E. Umstattd, president (seated); A. L. Bergstrom (left), and O. J. Horger (right)



In virtually every major industry you will find Timken Tapered Roller Bearings first choice of engineers.

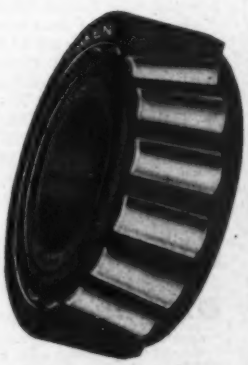
In gigantic steel mills — machine tools — motor cars and motor trucks — in paper making and in road building equipment — in countless types of war material, Timken Bearings are delivering amazing performance.

Such widespread acceptance is based simply and solely on the unexcelled service that Timken Bearings have given for nearly 50 years.

Our many years of research — our wide practical knowledge — plus Timken Alloy Steels and our unequalled manufacturing resources, are the basic reasons for the unfailing dependability of Timken Roller Bearings.

See that the trade-mark "TIMKEN" is on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

"All there is in Bearings"



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TAPERED ROLLER BEARINGS

Timken Bearings, Timken Alloy Steels and Tubing and Timken Removable Rock Bits

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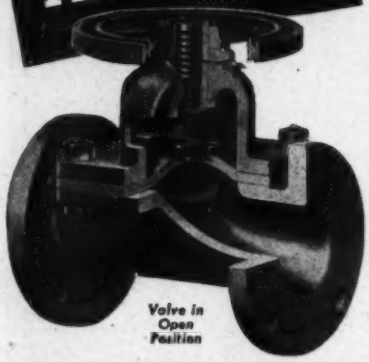

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Corrosion of Bonnet

Parts in Stock Lines

A tough resilient diaphragm of rubber or synthetic completely *isolates* the bonnet and its working parts from the body. It is impossible for stock to clog the bonnet or corrode the working parts. There is no chance of contamination of your product by accumulations of lubricant or other undesirable materials from the bonnet.

- ***Closure* is drip tight.**
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- ***Headroom requirement is low*—as much as 25% less than that required by other types.**
- ***Flow characteristics* at full open are close to those of gates and plug cocks, yet the valve lends itself admirably to *throttling*.**
- ***Available* in handwheel, lever operated and sliding stem types — the last named can easily be attached to standard operators. Body materials may be of any machinable alloy or cast iron, plain, galvanized, or lined with glass, lead, rubber, lacquer, paints, etc.**
- ***Size Range* ½ to 14" makes this valve available for practically every pulp and paper mill service where pressure does not exceed a maximum of 150 psi. (small sizes) down to 30 psi. for large valves and where temperatures (depending on service) do not exceed 200° F. Write for Catalog V-44. HILLS-McCANNA CO., 2433 West Nelson Street, Chicago 18, Illinois.**

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Proportioning Pumps—Force-Feed Lubricators — Chemical Valves — Air & Water Valves — Marine Valves — Magnesium Alloy Castings

Quiet restoration to employment and training on the job will be the plan for making them feel at home.

11. Special leaves, without pay, will be granted to veterans who wish to avail themselves of opportunities offered by the government for rehabilitation, training, or education.

Regardless of the date when veterans complete their war tasks, the executives state, they will be welcomed back to their jobs.

◆

CALCO CHEM. DIV. BUYS NEW JERSEY PLANT FROM SHERWIN-WILLIAMS CO.

On June 23, the Calco Chemical Division of the American Cyanamid Company at Bound Brook, New Jersey, purchased, at public auction, the Gloucester City, New Jersey, plant of the Sherwin-Williams Company.

Sherwin-Williams bought and equipped this plant approximately five years ago for experimental production of titanium dioxide. These experiments were recently completed, and as the Sherwin-Williams Company had no further use for the plant, it was offered for sale at public auction.

While no final decision has been made as yet by the Calco management, it is probable that a program will be started to make certain changes in the process that will result in the production of titanium dioxide, utilizing the information and experience gained at its factory in Piney River, Virginia.

Ames Hettrick, manager of the Piney River plant, will also be the manager of the new plant. The Gloucester City property is presently employing less than 200 people, but it is expected that when new installations have been made a larger force will be required to operate the new plant

◆

CHLORINE-CAUSTIC SODA PLANT ACQUIRED BY STAUFFER

The operation of the chlorine-caustic soda plant, which is part of Basic Magnesium, Inc., at Las Vegas, Nevada, has been taken over by the Stauffer Chemical Company of San Francisco, California.

This plant was built in conjunction with the magnesium plant in order to supply it with chlorine, and is one of the most modern chlorine-caustic soda units in the country. The electric power necessary for the operation is supplied by the station at Boulder Dam, Nevada, a few miles from the plant.

With the closing down of the magnesium metal manufacturing unit at Las Vegas, Stauffer will continue to manufacture chlorine and ship it to various industries throughout the country, principally to the East for war industries. Caustic soda will be available to consuming industries on the West coast.

◆

▶▶▶ AN EXPORT DEPARTMENT has been organized by Automatic Transportation Company, Chicago. This department will be located at 431 South Dearborn Street, under the management of Carl M. Wynne, who is a member of numerous foreign trade organizations, a director of the National Foreign Trade Council, and president of the Export Managers Club of Chicago. The company has established this department to better serve the increasing demand in foreign countries for its products.

◆

PEERLESS PUMP DIVISION HAS ACQUIRED DAYTON-DOWD CO.

The Peerless Pump Division, of the Food Machinery Corporation, Canton, Ohio, announces it has acquired the Dayton-Dowd Company, of Quincy, Illinois. The Peerless division has manufactured vertical pumps, whereas the Dayton-Dowd company has made horizontal centrifugal pumps.

The newly-acquired plant, operated as the Quincy works of Peerless Pump Division, will hereafter be able to supply vertical or horizontal design of pumps, plus augmented hydraulic engineering service.

◆

NATIONAL STARCH PRODS. CO. LEARNS ITS HOLLAND PLANT HAS BEEN LIBERATED

Although free communication with Holland is not yet established, National Starch Products Inc. has learned that its Dutch plant, Nationale Zetmeelindustrie N.V. of Veendam, Holland, was liberated April 14 by Polish troops of the Canadian First Army. The plant is reported to be undamaged despite its proximity to Groningen where heavy fighting occurred; and all of its personnel are said to be safe.

National Starch Products Inc. expects its Veendam plant will shortly resume the manufacture of potato starches, dextrins and liquid adhesives. Before the war, Nationale Zetmeelindustrie enjoyed a substantial export business to European countries, as well as Central and South America. Plans to recapture this trade are said to be well advanced even though until just recently, it was highly questionable if the plant still existed.

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S A F E T Y

DEPT. OF LABOR REPORTS ON SAFETY DRIVE IN THE PAPER AND PULP INDUSTRY

A report released recently by the Secretary of Labor states that ten thousand man days of work on critically needed paper products for the war were saved as a result of an intensive campaign to reduce accidents in the paper and pulp industry. The industry-wide safety drive was sponsored by the U. S. Department of Labor's Division of Labor Standards in co-operation with management and labor organizations, State labor departments, insurance companies, and other Government agencies.

"Work accidents did not disrupt the flow of vital war supplies as seriously from October through March as in the same six-months period a year ago in the industry because of the attention focused on accident prevention," Miss Perkins said. "Management, labor, and the cooperation agencies have every right to be proud of the drive which added 10,000 man days of work to war production. At this rate accident reduction can save the industry 20,000 man days of production and over 1¼ million dollars a year in direct and indirect costs. I am confident that this record is only a beginning for greater accomplishments in accident prevention by this important industry."

Recalling that nearly 11,000 paper and pulp workers were injured in 1943, the report emphasized that "In terms of human life and suffering the six-months record shows that the drive prevented at least 500 disabling injuries and 15,000 nondisabling injuries. Over $60,000 on wage losses to employees were also prevented by reducing lost time accidents. Safeguarding the life, health, and earning power of even one worker is an achievement which cannot be measured in money."

Paper and pulp mills in Southern, North Central, and New England States received special commendation for outstanding improvements in safety performance. A 37 per cent reduction in the accident frequency was achieved by the states of Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee. An over-all reduction of almost 33 per cent was made in Kentucky, Michigan, Ohio, and West Virginia, and more than 20 per cent in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

A reduction of more than 15 per cent was made in Pennsylvania, Maryland, and Virginia; 10 per cent in Illinois, Indiana, North Dakota, South Dakota, and Wisconsin; over 7 per cent in Arizona, California, Idaho, Montana, Nevada, Oregon, and Washington.

More than 900 paper and pulp mills with a total employment of about 150,000 are scattered throughout 36 States. More than three-fourths of the mills employ fewer than 100 workers. It is pointed out that only a few accidents a year in these plants can drastically hinder production and strain the limited manpower resources of the industry

(*Data on the contest conducted among pulp and paper mills during 1944 by the Department of Labor was published on page 1632 of the March (1945) issue of this magazine.*)

◆

▶▶▶ JAMES K. SKIPTON, who joined the Industrial Division of the National Safety Council last year as safety engineer for the Petroleum and Paper and Pulp Sections, has left the Council to become associated with the Zurich General Accident and Liability Insurance, Ltd.

◆

SAFETY SCORES

▶▶▶ PERFECT SCORES are recorded for seven mills at the close of May, the eleventh month in the 1944-45 Paper Industry Safety Contest. The following list of mills have a perfect record:

Division I—Pulp and Paper Mills

Groups A, B, and C (None)

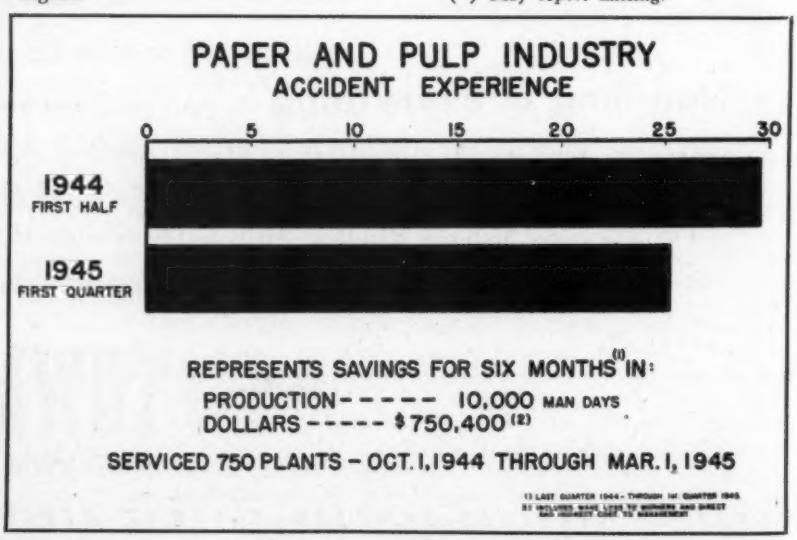
Grade D

Marathon Corp. (Ashland Div.)
Strathmore Paper Co. (Woronoco Mill No. 1), West Springfield, Mass.
E. I. du Pont de Nemours & Co., Newhall, Wilmington, Del.

Division II—Paper and Board Remanufacturing

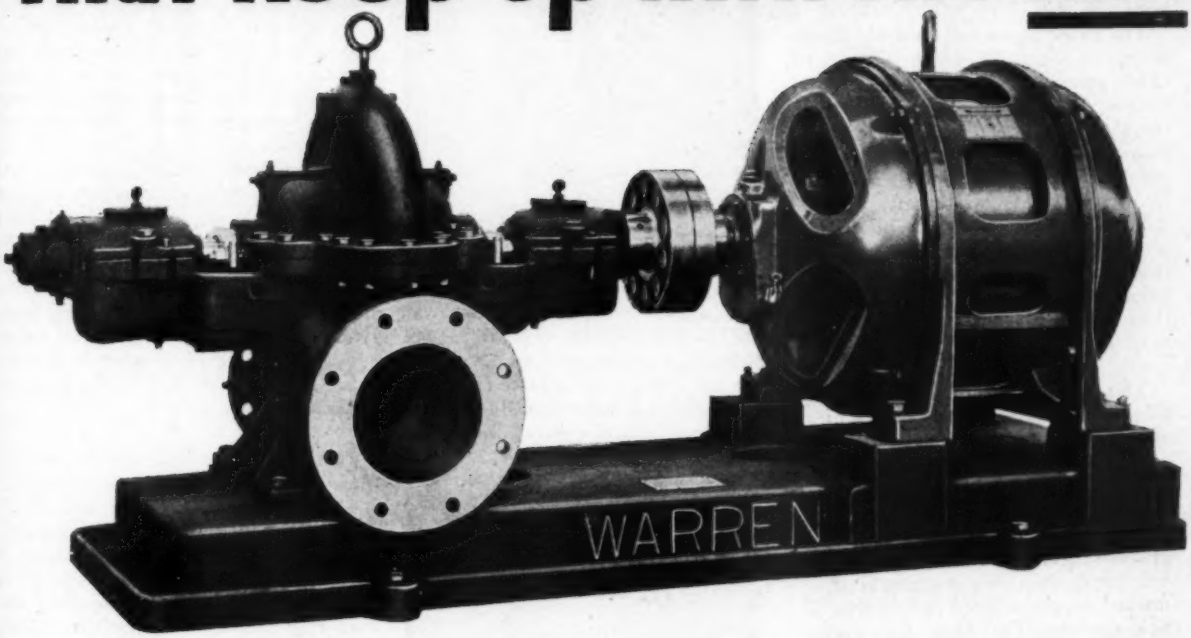
Ft. Wayne Corr. Paper Co., Chicago.
*Bird & Son, Inc. (Roofing Plant), Shreveport, La.
Iowa Fibre Box Co., Keokuk, Iowa.
Bay West Paper Co., Green Bay, Wis.

(*) May report missing.



PUMPS

that keep up with the mill



Warren Pumps have the ability to meet the increased demands of their jobs and this is being proven every day. For instance:

At the time of their installation at a well and favorably known eastern paper mill, each of seven Warren Pumps were called upon to handle eight hundred gallons of white water a minute. Then the capacity of the mill increased . . . so the operating speed of the pumps increased also to obtain a capacity of nine hundred gallons per minute. Later the tonnage of the mill increased and the same seven Warren Pumps are obtaining one thousand gallons a minute by simply operating at a still higher speed.

Performance with an available *plus* . . if that is the kind of performance *you* want, specify:

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC.

WARREN, MASSACHUSETTS

NAMES *in the* NEWS

Personals

DR. LOWE GIVEN AWARD FOR STUDY OF WOOD ROT

Dr. Josiah L. Lowe, of the New York State College of Forestry at Syracuse University, has just been awarded a grant in aid of research he is planning to do on his sabbatical leave this fall.

The award comes from the National Society of Sigma Xi, which is devoted to the encouragement of research and science. The cash award of $300 is for the purpose of aiding in a taxonomic study of the pore fungi of the eastern United States. In other words, Dr. Lowe, who is an authority on the subject through previous publications and investigations, will make a further study of the classification and the relationships between various species of these organisms which cause rot in lumber and other products of the forest.

This announcement was made by George A. Baitsell, executive secretary of Sigma Xi at Yale University.

Dr. Lowe plans on spending three months in connection with these studies at State College, Pennsylvania, and three months at Harvard. The material accumulated by Dr. Lowe will be used in the preparation of a manual on the subject, which will be published by The New York State College of Forestry. Dr. Lowe will begin his studies September 1 and will report the result of his work to the office of the Secretary of Sigma Xi at Yale University.

◆

NEW APPOINTMENTS AT MANDO

M. S Wunderlich, director of research for Minnesota and Ontario Paper Company, Minneapolis, Minnesota, has announced the appointment of Gilbert Stevens as his assistant.

In his new position as paper and pulp products engineer, Mr. Stevens, who has engaged in various production, research, and technical activities for Mando, will be responsible for the investigation of new or improved grades of paper and pulp products. He is further assigned, Mr. Wunderlich states, to generally supervise the development of processes for the coating papers and to co-ordinate the efforts of research, production, and sales in the above field.

Mr. Stevens has been associated with

Gilbert Stevens

Mando since 1939, having come from the Kimberly-Clark Corporation, of Neenah, Wisconsin, where he was in the sales promotion department. Prior to that he was connected with the Appleton Coated Paper Company of Appleton, Wisconsin.

Rondeau O. Warner

Rondeau O. Warner has been appointed sales manager of the paper division for Mando, with headquarters at Minneapolis, Minnesota. Prior to his new appointment, Mr. Warner had been manager of merchant sales for the company since 1938, with headquarters in Chicago. His association with Mando dates back to 1913. In the intervening years, he gained wide experience in many branches of the company's activities.

◆

STUART FIEDLER NOW WITH BJORKSTEN LABORATORIES

The Bjorksten Laboratories, Chicago, announce that Stuart O. Fiedler, B.S., Ch.E., has joined that organization as a research associate.

Mr. Fiedler was for several years connected with the C. F. Burgess Laboratories as a research chemical engineer, and in this situation acquired unusual experience and insight in applications of electro-chemistry as well as in organic applications of physical chemistry.

Subsequently, Mr. Fiedler for a period of 15 years was research chemist and group leader at the E. I. du Pont de Nemours & Company, which he left to become technical supervisor of the protein plant of the Drackett Company. His most recent position, before joining Bjorksten Laboratories, was supervisor of a research division in the Quaker Chemical Products Corporation.

◆

▶▶▶ Following meetings of directors of Maclaren-Quebec Power Company and of Maclaren Power and Paper Company, held in Montreal, announcement was made of the appointment of *A. Roy Maclaren* as president of Maclaren Quebec Paper Company and as vice president of Maclaren Power and Paper Company. In these two offices, Mr. Maclaren succeeds the late T. F. Kenny.

◆

CUTLER-HAMMER HOLDS ELECTION OF OFFICERS

At the annual meeting of the board of directors of Cutler-Hammer, Inc., Milwaukee, F. R. Bacon, president and founder of the company has resumed the position of chairman of the board, which office he formerly held. H. F. Vogt becomes chairman of the company's Executive Committee and continues as vice president. In addition, Mr. Vogt was made treasurer.

G. S. Crane, formerly vice president in charge of sales and engineering becames president. Four vice presidents were elected as follows, each having been with the company for 25 years or more: P. B. Harwood, in charge of engineering; P. S. Jones, in charge of sales; Phillip Ryan, in charge of manufacturing; E. W. Seeger, in charge of development.

Where ordinary woods deteriorate, use Tidewater RED CYPRESS

The high humidity constantly present in your production operations is fatal to ordinary woods, which quickly deteriorate under such extreme conditions. The use of the Heartwood of **Tidewater Red Cypress**, however, has proved itself practical and desirable. This **Tidewater Red Cypress** Heartwood withstands abuses to a remarkable extent and is, in fact, classified in the "Wood Handbook" of the U. S. Department of Agriculture as a species "durable even when used under conditions that favor decay."

For Years of Satisfaction, Build Tanks, Vats and Tables of *Tidewater Red Cypress*

Wood is the best known material for many of the uses to which tanks, vats, tables, sidewalls, ceilings, and refrigeration installations are exposed. However, to be practical, the wood must meet rigid specifications—it must neither warp nor twist; it must have a minimum tendency to shrink or swell; it must be impervious to heat or cold; it must be unaffected by the presence of liquids on one side while the other side is dry; it must be chemically inert; and it must impart neither taste, odor nor color to the contents.

Users have found **Tidewater Red Cypress** to be one of the most efficient species obtainable. **Tidewater Red Cypress** is easy to work, very closely grained, and can be used economically and successfully for every Paper Mill installation.

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TIDEWATER RED CYPRESS

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SAINT LOUIS 10, MISSOURI

L. J. PARANT RETIRES

The industry learns with deep regret of the retirement of L. J. Parant as vice president and general manager of the St. Croix Paper Company, Woodland, Maine. Mr. Parant left his position on June 30th.

Active in the newsprint industry for a number of years, Mr. Parant was well known throughout the East and in Canada. He became associated with St. Croix in 1915, after serving in the capacity as superintendent with Finch, Pruyn Company, Glen Falls, New York, for eleven years. He was appointed general manager in 1923, became a director in 1926 and vice president and general manager in 1930. He will remain a member of the board of directors.

Mr. Parant was a prominent safety leader in the State of Maine, and the St. Croix company has made such outstanding progress in safety that it has won special recognition and a number of awards for its accident prevention work.

The Parants will move to a new home in Kingsbury, New York. Their postoffice address will be R.F.D. No. 1, Hudson Falls, New York.

◆

GRANT RICHARDSON IS NOW DIRECTOR OF PAPER DIVISION

About May 1, Grant Richardson, of Hammermill Paper Company, Erie, Pennsylvania, became assistant director of the Paper Division of the Forest Products Bureau of the WPB. Mr. Richardson now has been appointed director of the Paper Division of the Forest Products Bureau. In this position he succeeds Walter Wilcox, who has returned to S. D. Warren Company.

Before going to Washington, Mr. Richardson spent several years as export manager and district sales manager for the Eastern territory for Hammermill. Since taking up the work at Washington, he has been serving as a member of the Paper Advisory Board of the Foreign Economic Administration.

◆

SALES OF ALLIANCE PULP NOW HEADED BY ED THOM

Edward J. Thom, manager of pulp sales for Howard Smith Paper Mills Limited and Canada Paper Company, with headquarters at 407 McGill Street, Montreal, Quebec, has also been appointed manager of pulp sales for Alliance Paper Mills Limited of Merritton, Ontario, manufacturers of bleached and unbleached sulphite. J. R. Leslie, who formerly handled the sale of Alliance pulp has recently been made controller of Howard Smith Paper Mills Limited and subsidiary companies and will be located at Montreal.

L. J. Parant

Grant Richardson

Edward J. Thom

This change will bring under the one direction in the head office of Howard Smith Paper Mills Limited the sale and distribution of the various grades of wood pulp made by the Howard Smith organization.

Ed Thom served with the Canadian Army in the first World War and started in the paper manufacturing business in 1920 with the Beauharnois Division of Howard Smith Paper Mills Limited. In 1927 he was transferred to the pulp department in Montreal and has since been responsible for the sale of groundwood made at Crabtree Mills, Quebec, bleached sulphite and bleached soda pulp made at Cornwall, Ontario, groundwood, bleached and unbleached kraft made at Windsor Mills, Quebec, and bleached flax pulp made at Beauharnois, Quebec.

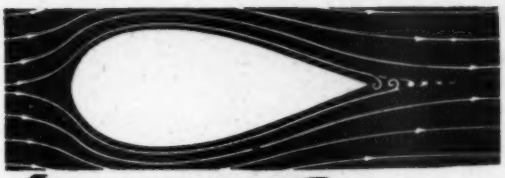
Mr. Thom has traveled extensively in the United States and Canada and is well known to the paper and pulp trade of both countries. He is Chairman of the Groundwood (pulp) section of the Canadian Pulp & Paper Association.

◆

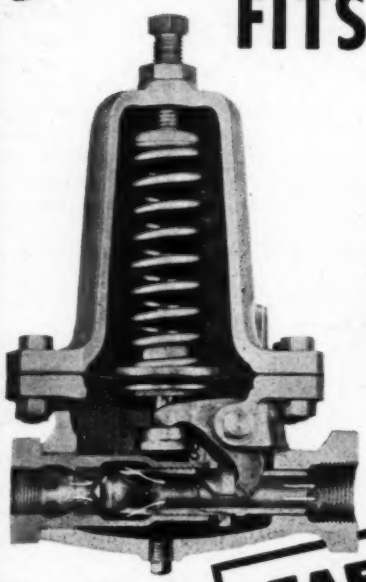
GEO. M. McKEE RETIRES

Retirement of George M. McKee from Consolidated Paper Corporation, Montreal, Quebec, on account of ill health was announced on June 1. Mr. McKee, assistant to the president of Consolidated and in charge of the company's manufacturing operations, has had an outstanding career in Canada's pulp and paper industry since going to that country in 1912. In that year, he built Donnacona Paper Company and was its managing director until 1922. During part of this period he served as President of the Canadian Pulp and Paper Association. Mr. McKee became successively president of Port Alfred Pulp and Paper Corporation, 1922-25; managing director of St. Maurice Valley Corporation in 1926; then managing director of Canada Powper and Paper Corporation until the organization of Consolidated Paper Corporation in 1921, with which company he has been associated in an executive capacity ever since.

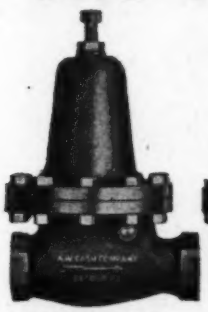
The retirement of Mr. McKee rounds out an industrial career of nearly 50 years, for prior to coming to Canada and becoming a naturalized citizen, he entered the paper industry with the Friend Paper Company, West Carrolton, Ohio, in 1897. The following year he became president of Kinkley Fibre Company, retaining the position until moving to Canada in 1912.



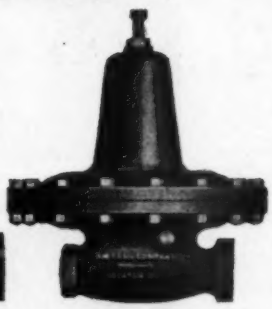
THIS *Streamlined Design* FITS THE JOB . . . .



The positive moving valve arrangement in STREAMLINED housing, with its continuous-duty performance, insures against trouble from gumming up, thereby minimizing maintenance.



Type 1000—HP
Normal size diaphragm. Made for high delivery pressure.



Type 1000—LP
Has large diaphragm. Made for low delivery pressure.

CASH STANDARD *Streamlined* TYPE 1000 PRESSURE REDUCING VALVES

- Trouble-free service
- Smooth operation
- Tight closure
- Accurate regulation
- Elimination of failures
- Constant delivery pressure
- No spoilage
- Maintenance needs practically zero
- Speedier production results
- Cost-saving operation

You may not have realized previously the exact value Streamlined flow around the inner valve can have for a line such as yours.

The "1000" does assure you such performance as the following . . . maximum capacity when needed most . . . accurate pressure control under tough operating conditions . . . no variations in the reduced pressure . . . wide opening valve that permits of maximum flow. Before you get your "1000" valve it is made to work under the identical pressure conditions given on your purchase order. We make sure in this way that it fits the job . . . we do know that Streamlined flow is right for the job and you will quickly find it so.

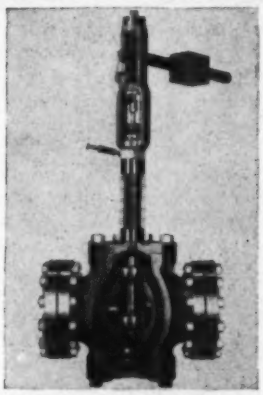
●

Bulletin "1000" gives you details on elimination of erratic pressure, savings in operating and maintenance costs, and complete performance facts of the CASH STANDARD Streamlined Type 1000 Pressure Reducing Valve.

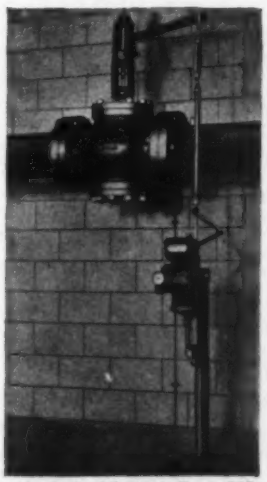
CASH STANDARD CONTROLS . . VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

OTHER VALVES *from the* CASH STANDARD LINE



Cash Standard Balanced Valves, Series 42, have no lost motion. Have roller guides that kill side strains; stop packing trouble. Practically no maintenance. Sizes ½" to 12"; pressures up to 600 lbs. temperatures to 800° F. Bodies: iron, bronze, steel; all standard trims. With Air Cooled Packing Box (42-AC-R) shown above; or water cooled; or no cooling box. Made also with center guide. Bulletin 965.



The Cash Standard Type 100 Controller above is operating an 8" Type 42-R Balanced Valve, automatically reducing 250 lbs. down to 125 lbs. pressure, handling 200,000 lbs. steam per hour.

Type 100 Controllers have lots of operating power, enough for any size valve; are fully compensated; have adjustable range; are very sensitive. Bulletin 963 covering the Controller and Bulletin 965 covering the Valve give complete and interesting details. Write for them.

C. E. KINNEY HAS RETIRED

C. E. Kinney, who has been an employee of Hercules Naval Stores Department for the past 25 years, retired on June 30. Mr. Kinney was assistant to the director of operations, Naval Stores Department. He had been associated with the wood naval stores industry for the past 40 years.

Mr. Kinney graduated from the University of Michigan with a B.A. degree in chemical engineering. During summer vacations, he worked in several paper mills with the intention of working with a paper company after his graduation. But his plans took a turn and he went to the University of North Dakota to teach and to assist one of the professors in analyzing wood rosin, which was then being made on a small scale in Michigan, Minnesota, and Wisconsin. He became so interested in the wood naval stores industry that he decided to make it his life work.

Mr. Kinney is a member of the American Chemical Society, the Technical Association of the Pulp and Paper Industry, and the American Society of Testing Materials.

◆

ARNOLD PLIER WILL DIRECT PRODUCTION AT D. J. MURRAY

Arnold W. Plier has been named assistant general manager in charge of production of the D. J. Murray Manufacturing Company, Wausau, Wisconsin. In March, Mr. Plier was elected secretary of the company. His present position carries additional duties in which he will direct all work pertaining to production.

Mr. Plier has been with D. J. Murray Manufacturing Company since 1930. Prior to that time he was associated with several Wisconsin paper mills.

◆

WALTER F. WYMAN IS NOW WITH BULKLEY, DUNTON & CO.

Well known in the paper and graphic arts industries, Walter F. Wyman has now joined the paper division of Bulkley, Dunton & Company, New York City.

Mr. Wyman has been a representative of Crocker-Burbank papers for the past 20 years. He joined Clarke and Company exclusive sales agents for Crocker-Burbank in 1925, and when the latter established their own sales agency in 1938, Mr. Wyman continued his activities in selling and promoting the company's papers.

Prior to his association with the paper trade, Mr. Wyman has had 16 years of experience in the export business as sales manager of the Mexican and Central American Department of the U. S. Steel Export Company. He served as assistant manager of the company's Havana (Cuba) office, and later as manager of its Mexico City Office.

C. E. Kinney

Arnold Plier

Walter F. Wyman

◆

PERSONNEL CHANGES AT PACIFIC PAPERBOARD CO.

The Pacific Paperboard Company, Longview, Washington, has advanced K. W. Gordon, production manager, to the position of superintendent. Mr. Gordon has been with the company 17 years and fills the vacancy created by the resignation of John Baum.

The company has inaugurated a plan of having an assistant superintendent on duty at all times. Therefore, the following four men were named to that position: Arnold Maahs, who has been with the company 15 years; Orville Latimer, a 10-year employee; George Pietila, a 12-year employee; and James Carney, formerly of White Pigeon, Michigan.

L. V. Boeppler, of Oakland, California, has been named manager of the conversion plant, with W. W. Weaver, of White Pigeon, being named research technician.

The company has built an addition to the conversion plant. Three new machines are being placed in operation, giving a capacity of 1,000 tons per month.

◆

▶▶▶ The resignation of *H. E. Houghton* as vice president and general sales manager of Brown Company, New York City, has been announced. Mr. Houghton is leaving Brown Company to join Muzak Corporation as chairman of the board. Pending the appointment of Mr. Houghton's successor, the company's sales department will be in charge of *Downing P. Brown*, vice president and assistant to the president.

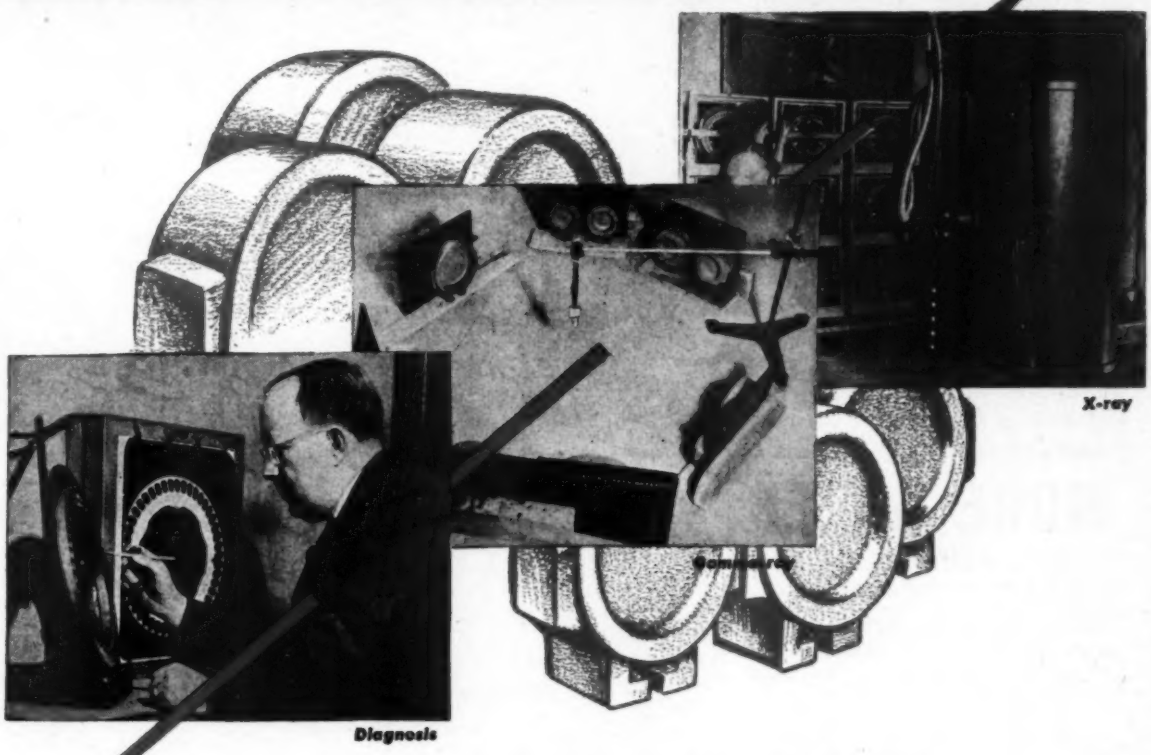
◆

▶▶▶ The appointment of *Dr. Richard P. Carter* as chief chemist of Hercules Powder Company's Mansfield (Mass.) chemical plant has been announced. Dr. Carter, who for the past two years has been an assistant to Raymond F. Schlaanstine, director of operations of Hercules Synthetics Department, in Wilmington, succeeds Dr. R. L. Marsh, who has resigned.

◆

▶▶▶ *George Henderson*, comptroller of Consolidated Paper Corporation, Montreal, since its organization in 1931, has been appointed a vice president of the corporation. Mr. Henderson's connection with the pulp and paper industry dates back to 1918 when he became comptroller of Wa-

THREE KINDS OF "EYES"



LOOK THROUGH *Cooper* STAINLESS CASTINGS

THE ONLY ALLOY FOUNDRY WITH ALL THESE FACILITIES

- Laboratory control over new materials and finished products.
- Dual foundry . . . both hand and machine molding.
- Electric arc and high-frequency induction melting furnaces.
- Centrifugally-cast castings.
- Heat treating of Castings up to six feet.
- X-ray and Gamma-ray inspection.
- Precision Castings.
- Machine shop . . . specially equipped for finishing stainless steel.
- Improved cleaning . . . including Lustracast electrolytic finishing which leaves all surfaces bright.
- Castings furnished rough, polished or fully machined . . . one ounce to two tons.
- Development of special alloys to meet unusual requirements.
- Technical consulting service.
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At the Cooper Alloy Foundry we use three kinds of "eyes" to check the soundness of castings. We use three because all three are necessary to do a thorough, economical job — for your complete assurance. These "eyes" are: X-rays and Gamma-rays plus expert human eyes that are trained to interpret the results of radiographic pictures.

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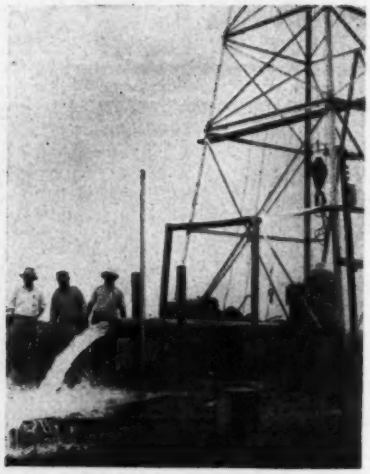
125 BLOY ST., HILLSIDE, N. J.

THE *Cooper* ALLOY FOUNDRY CO.
STAINLESS • MONEL • NICKEL



Industrial Expansion Will Call For

MORE WATER

And low cost per Million gallons is going to be a mighty important factor. That brings Layne Well Water Systems and Layne Vertical Turbine Pumps squarely into the picture. Layne Water Producing equipment has always been highest in efficiency, consequently lowest in cost to operate.

In the first place, Layne is the World's largest builder of Well Water Systems—and makers of the finest quality Vertical Turbine Pumps. For years Layne has operated in almost every part of the world, thus gaining experience and knowledge of unmistakable value. Layne built more Well Water Systems for World War II industries, camps, and air fields than any ten competitive firms combined.

If you are looking toward economy in your industrial water system, Layne has many basic facts to present—facts that may save you many hundred dollars annually. Write, wire or phone for further details. LAYNE & BOWLER, INC., General Offices, Memphis 8, Tennessee.

LAYNE PUMPS *—fulfill every need for producing large quantities of water at low cost from wells, streams, mines or reservoirs. Send for literature.*

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minnesota, Minneapolis, Minn. * International Water Supply Ltd., London, Ontario, Canada * Layne-Hispano Americana, S. A., Mexico, D. F.

LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

yagamack Pulp and Paper Company, Ltd., Three-Rivers, Quebec, *Richard Collins*, who has been manager of the Wayagamack Division since 1932, has been appointed manager of manufacturing for Consolidated.

◆

▶▶▶ Controller of Howard Smith Paper Mills, Ltd., and subsidiaries is the new appointment given to *John R. Leslie*. Mr. Leslie has been loaned to the Allied War Supplies Corporation since July, 1940. In 1919, Mr. Leslie accepted a position with Lincoln Paper Mills at Merritton, Ontario, and rose to the position of controller and treasurer of that company's successors, Lincoln Mills Ltd., Lincoln Pulp and Paper Company, and Alliance Paper Mills Ltd.

◆

▶▶▶ *J. A. (Jack) Lowander*, assistant vice president of Stein, Hall & Company, Inc., New York, and business manager of its Long Island City factory where adhesives for the paper box, envelope and other industries are made, is severing his connection with the company July 31. Mr. Lowander joined the company in 1921, and since then has been associated most of the time with the adhesive part of the business.

◆

▶▶▶ *Frank S. MacDonald*, production manager of the J. R. Booth Company, Ottawa, has joined the organization of Sherbrooke Machineries, Ltd., Sherbrooke, Quebec. Mr. MacDonald brings to the equipment manufacturing field twenty-five years of varied experience in pulp and paper manufacturing, having been employed by Spruce Falls Power & Paper Company Dryden Paper Company, and Newfoundland Pulp and Paper Company, at Cornerbrook, Nfd.

◆

▶▶▶ *Fred O. Koetteritz* who, from 1939 to 1944, was chief inspector of the Wage-Hour Division of the U. S. Department of Labor, has joined the management engineering division of the Labor Relations Institute, New York, according to an announcement by O. C. Cool, director of that organization.

◆

MAJOR HOLT OF MARATHON RECEIVES DECORATION FROM THE REPUBLIC OF CHINA

The Republic of China has decorated Major George Holt, Jr., recently appointed sales manager for Waxtex and other resale products of Marathon Corporation, Menasha, Wisconsin. His award, the Badge Cloud Decoration

Major George Holt

with Citation of Merit, was bestowed in recognition of his contributions to the training of Chinese Airforce personnel. Prior to release from the Army, Major Holt was commanding officer in charge of the preliminary and pre-flight training of all Chinese Airforce personnel training in the United States.

Two more Marathon sales representatives have entered the Armed Forces. They are Robert Kuehl, frozen food package development specialist, and Jack Thomsen, Columbus territory representative.

◆

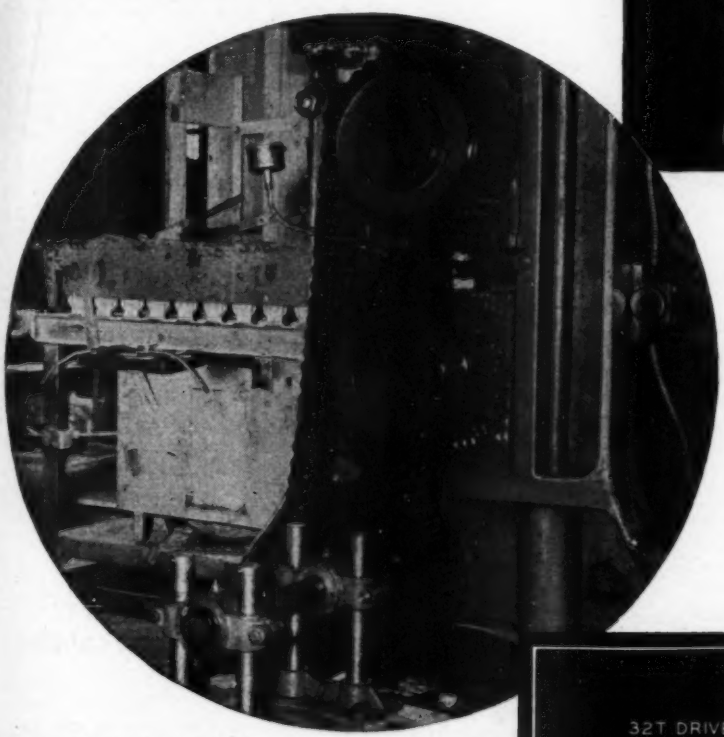
FARREL-BIRMINGHAM MAKES ROBT. HONEGGER G. M. OF BUFFALO GEAR PLANT

The appointment of Robert M. Honegger as general manager of its gear plant at Buffalo, New York, has

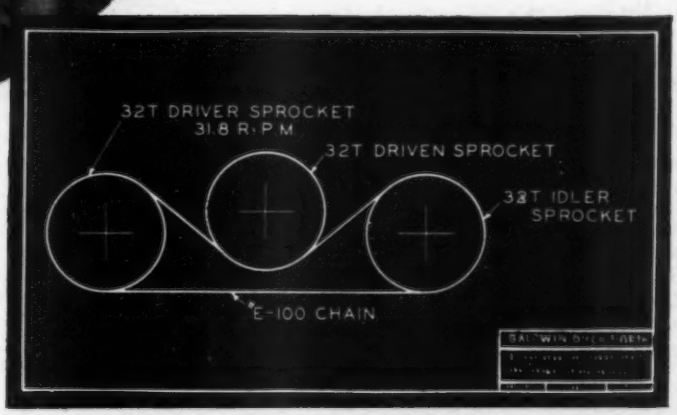
Robert Honegger

Do you want POSITIVE Power Transmission?

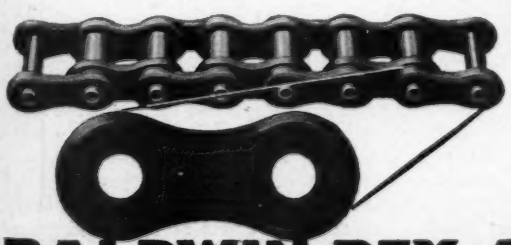
① DO YOU NEED a drive that transmits positive power . . . a drive that doesn't slip or fail in emergencies? Here it is—Baldwin-Rex Roller chain belts.



② THIS CALENDER DRIVE, for example, has the extra strength and stamina that a positive drive needs. The triple strand of Baldwin-Rex doing the driving keeps the power flowing. There's no slipping here to waste power and time . . . no jerky, uneven power transmission. Turning those heavy rolls is child's play for husky Baldwin-Rex. It really stands up in tough service.



③ IT'S A HUSKY DRIVE as this drive arrangement shows. Whenever power is to be transmitted economically and efficiently without waste, Baldwin-Rex Roller chain belts can do the job. They have high shock-absorbing ability and are not adversely affected by dust or grease. Their ease of installation and effective operation regardless of center distances make them ideal for all types of power transmission work.



For catalogs on Baldwin-Rex Roller chain belts or competent information on your specific drive problems, write **BALDWIN-DUCKWORTH** *Division of* **CHAIN BELT COMPANY,** 367 *Plainfield Street, Springfield 2, Mass., or call your local Baldwin-Rex representative.*

BALDWIN-REX ROLLER CHAIN BELTS

Baldwin-Duckworth Division, Springfield 2, Massachusetts • Rex Chain Belt and Transmission Division, Rex Conveyor and Process Equipment Division, Milwaukee 4, Wisconsin

been announced by Farrel-Birmingham Company, Inc., of Ansonia, Connecticut.

Mr. Honegger has been associated with the F-B organization since 1925. He was a member of the engineering department until 1935, when he became general foreman. Later he became plant superintendent, which position he held until his recent appointment. He succeeds Lester D. Chirgwin, formerly of Buffalo and now of Ansonia. In March of this year, Mr. Chirgwin was elected vice president in charge of manufacturing in all four F-B plants.

◆

▶▶▶ *Samuel M. Bratton* has resigned as chief engineer of the paper machine division of Pusey and Jones Corporation, Wilmington, Delaware. Mr. Bratton was first employed as a draftsman in 1917, becoming assistant chief engineer in 1930 and chief engineer in 1934. He was previously employed by the Hilles and Jones Company, now affiliated with the Consolidated Machine Tool Companay. Mr. Bratton has not announced any plans for the future.

◆

▶▶▶ After serving with the WPB and predecessor agencies in Washington since 1941, *E. J. Hergenroether* has resigned as chief of the Metallurgical Branch of the Steel Division of WPB. Mr. Hergenroether has resumed his duties with the Development & Research Division of the International Nickel Company, Inc., New York City. He will have his headquarters at the company's field office in Detroit, where he will be in charge of the Division's automotive steel development.

◆

▶▶▶ Export sales manager is the new appointment given *Leon D. Thompson* by Oliver United Filters Inc., New York. Mr. Thompson is a graduate of Stevens Institute of Technology, Mechanical Engineering. He is located at the company's New York office. Mr. Thompson has been with Oliver as a technical filtration engineer for more than twenty-five years.

◆

▶▶▶ Sales promotion manager of the General Products Division is the appointment given to *Howard W. Kelsey* by the U. S. Rubber Company. Mr. Kelsey has had more than 17 years of experience in advertising and sales promotion work, including 10 years as owner of his own agency and 18 months with Batten, Barton, Durstine and Osborn, Inc. Since 1944, he has been handling wire and cable promotion in the rubber company's Mechanical Goods Division.

Necrology

LT. E. VIGGO ULLMANN

The sudden passing of Lt. E. Viggo Ullmann on June 15 brought a great loss to the paper machinery manufacturing world. The Lieutenant also will be missed by his native Norway.

Lt. Ullmann was born at Vardo, Norway, in 1907, and graduated from the Norwegian Technical University as a mechanical engineer in 1931. He had been operating engineer at Moelven Cellulosefabrikk and Krogstad Cellulosefabrikk in Norway before becoming director in the Japanese branch of Gadelius and Company, Aktiebolaget of Stockholm, Sweden, representative for Kamyr equipment for pulp and paper industries. He spent five years in Japan before the outbreak of war, and he and his family left Japan on the last boat leaving with Allied nations personages.

The Lieutenant then went to Canada and joined the staff of Paper Machinery Limited and became associated with Gustaf L. M. Hellstrom as a consulting engineer. He joined the Royal Norwegian Air Force and became an instructor and technical officer at Little Norway, a school for Norwegian airmen at Toronto. Since the closing of this training program, he had served on the Norwegian Postwar Planning Board in New York City and Washington.

On July 1, Lt. Ullmann was to have become associated with the Sandy Hill Iron & Brass Works, paper machinery manufacturers and manufacturers of Wamyr equipment in the United States, in a sales engineering capacity.

Lt. Ullmann is survived by his widow and two daughters.

◆

▶▶▶ The Navy Department has notified the parents of *Lieutenant Harry Leigh Derby, Jr.*, U.S.N.R., that he was killed in action in the Pacific. Lieutenant Derby was 38 years old. Before volunteering for Navy duty in 1942, he was Western Sales Manager for the American Cyanamid & Chemical Corporation in Chicago. He is survived by his widow, two daughters, and a son, Harry L. Derby III.

◆

DAVID OWEN EVANS

On June 7, in London, David Owen Evans, vice president of The International Nickel Company of Canada, Limited, and chairman, The Mond Nickel Company, Limited, its British affiliate, passed away at the age of 69.

Mr. Evans was affiliated with many notable organizations. Since 1932, he had been Knight Bachelor Designate, Liberal Member of Parliament for Cardiganshire, North Wales. King George had approved the conferment upon Mr. Evans of the Honour of Knighthood and an announcement to this effect appeared in the Honours List published on June 7. He had been a vice president of The International Nickel Company of Canada, Limited, since 1936.

◆

▶▶▶ The passing of *Victor Sydney Bennett*, on June 3 in Newfoundland, has been reported. Mr. Bennett was a pioneer in the field of air mail service and was well known throughout financial pulp and paper and aviation circles in Eastern Canada, as well as in Newfoundland. He was 46 years of age, and was a son of Sir John Bennett. He is survived by his widow, of London, England, one son and two daughters.

◆

▶▶▶ President and general manager of the Clarage Fan Company, *Roland R. Ware* passed away at his home in Kalamazoo, June 21. He was 61 years of age. Mr. Ware had been general manager of the company for the past 15 years, and president since May, 1943. He was actively identified with the National Association of Fan Manufacturers, having served as president of that organization.

◆

FOUR RESEARCH EXPERTS GIVEN POSTHUMOUS AWARDS

Four research experts of the Standard Oil Company (Ind.), lost their lives in May of last year by the explosion of a flame thrower. The men who were conducting a research program at the Whiting (Ind.) refinery under the auspices of the National Defense Research Committee, have been honored posthumously in certificates of merit presented by the Office of Scientific Research and Development. They were: Frank V. Ovitz and James G. Nellis, chemical engineers; John Leonard, engine mechanic; and John J. Hanusin, engine laboratory foreman. Eight others who worked on the project received similar awards.

In forwarding the certificates to the families, Dr. Robert E. Wilson, chairman of the board of the company, said that "the contributions they made for Victory were as real in every sense as those of our troops in battle. The development program on which they were working was of real importance in advancing the flame thrower to the important place on the battlefield which it occupies today."

LARGE STAINLESS STEEL WELDING FITTINGS

by Pittsburgh Piping and Equipment Co.

Single Order for
Reduction Engineering Corp.
Newark, New Jersey
2 Pcs. 8" 180° Stainless Steel Return Bends
Wall Thickness 5/16"
S.S. Type—347

THE Stainless Steel Division of Pittsburgh Piping & Equipment Company is prepared to furnish Stainless Steel Welding Fittings in single units or in large quantities.

45° and 90° Elbows, 180° Return Bends, Reducers, Tees, Caps, and Lap-joint Nipples, are available in Stainless Types Nos. 304, 316, 321, 347; also furnished to other analyses. I.P.S. sizes range from ⅛" to 10"; tube sizes from 1" to 24" diameter.

These fittings are annealed, blasted, and passivated for best corrosion resistance. The ends are accurately machine cut and beveled to 37½° with approximately 1/16" straight face. The radius of each Elbow is 1½ times the nominal pipe diameter.

Send us your specific requirements. We will give you complete information promptly, without obligation.

STAINLESS STEEL DIVISION

Pittsburgh Piping

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10 Forty-Third Street—Pittsburgh, Penna.

DO MORE THAN BEFORE—BUY EXTRA WAR BONDS

TIGHT VALVES CONSERVE FUEL

PREVENT HOLD-UPS IN PRODUCTION

LUNKENHEIMER VALVES STAY TIGHT WITH LESS CARE

With today's production problems and the urgent necessity for conserving fuel, it is more important than ever to avoid wasteful, costly, production-lowering valve leakage. It's good business to maintain a regular check on valves, to make sure that they are *tight* and in proper working order. Maintenance men prefer Lunkenheimer Valves. They know these *quality-built* Valves serve longer and better on the job—are easier to keep tight with a minimum of time, labor, and expense.

The Lunkenheimer Co., Cincinnati 14, Ohio, U. S. A. *Branch Offices:* New York 13, Chicago 6, Boston 10, Philadelphia 7. *Export Department:* 318-322 Hudson St., New York 13, N. Y.

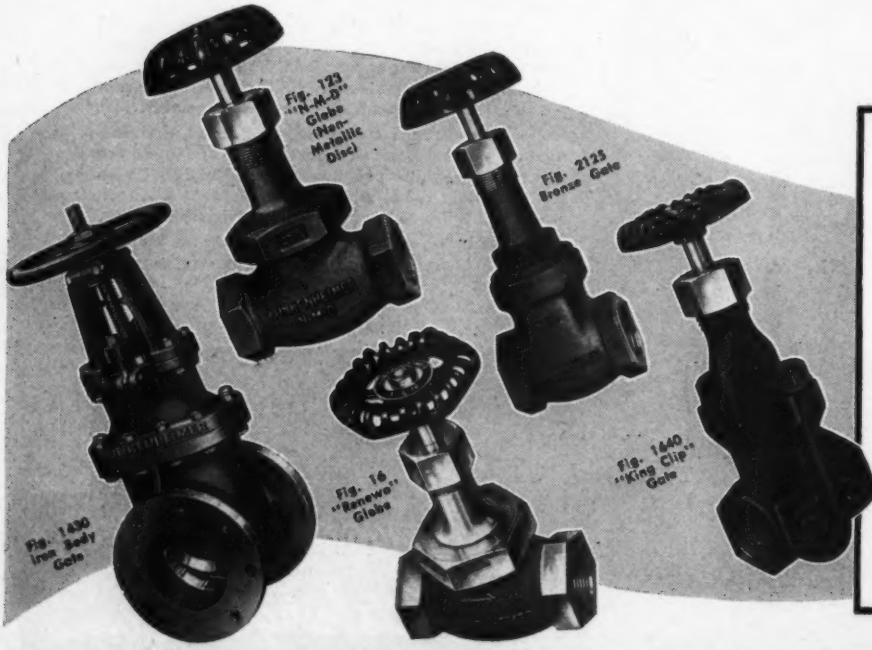


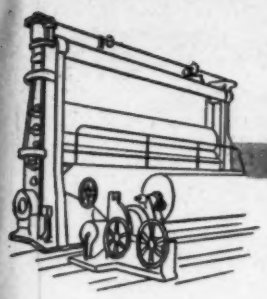
Fig. 123 "N-M-D" Globe (Non-Metallic Disc)
Fig. 2123 Bronze Gate
Fig. 1440 "King Clip" Gate
Fig. 16 "Renewo" Globe
Fig. 1430 Iron Body Gate

A Lunkenheimer Distributor is located near you, ready at all times to assist with your maintenance and operation problems. You will profit by using his service.

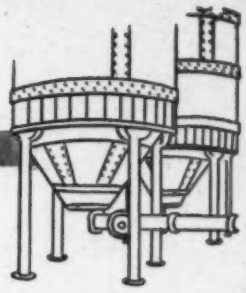
LUNKENHEIMER VALVES

BRONZE, IRON, STEEL AND CORROSION RESISTANT ALLOY VALVES, 125 TO 2500 LB. S. P.; BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS

1945



Practical SHORTS

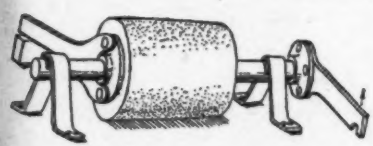


Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

Dismounting a Worn Out Pulpstone

A method commonly used for loosening flanges on a shaft carrying a worn out pulpstone is illustrated in the accompanying sketch.

After removing the stone and shaft from the grinder, the shaft is bolted down to the floor through the use of a pair of simple yet sturdy holders, one for each end of the shaft. Then a pin or wrench is positioned on the flange to be removed; and an I-beam about ten feet long, to the driving shaft. Such an I-beam functioning as a lever arm, should turn the shaft, thus freeing the flange, when the lifting power of a 10 or 15-ton crane is applied at its free end. There have been many individual cases, however, where the tremendous force of the crane simply bent the I-beam without turning the shaft.



Mills using four-foot grinders usually are equipped with heavier cranes. In cases of this kind, it is possible to use a wrench so strong that it will turn the shaft even if the threads are stripped in the process.

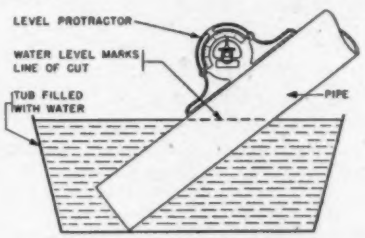
Heating flanges before attempting removal, especially with the larger stones, has some supporters. One mill has found it advantageous to introduce steam at 100 lb. pressure for about an hour through a small hole in each flange before attempting removal. In this case, the space between stone and the face of the flange should be air-tight. Usually, the flange holes are filled up with wooden plugs. These plugs not only keep out steam and water but also help to prevent wear to the sides of the holes.—*Bernard Bornstein*, THE PAPER INDUSTRY AND PAPER WORLD, 24, No. 12 (March, 1943).

◆

How to Make Mitered Joints for Pipe Elbows

There is a remarkably easy way to mark the correct line of cut on pipe when making mitered joints for pipe elbows. Sole requirements are a tub of water and a level protractor.

Submerge the end of the pipe under water at one-half the desired angle of bend, using a level protractor. By marking the pipe at the water level with chalk or soapstone, the correct line of cut for that particular angle is readily indicated. If desired, a templet can be made for duplicating the cut on other pipe of the same diameter, by placing a piece of heavy paper squarely about the pipe, tracing the cut, and then cutting away the scrap portion of the paper to form a permanent templet.



In the example shown in the sketch, the pipe is inserted in the water at an angle of 27½ degrees which will give a two-piece mitered joint of 75 degrees. If a bend consisting of more than two sections is desired, the correct angle of each cut required to arrive at the total angle of bend can be determined from the following equation:

$$\frac{\text{Total Angle of Bend}}{2 \times (\text{Number of Sections} - 1)} = \text{Angle of Cut}$$

—OXY-ACETYLENE TIPS

◆

Protecting Skin From Organic Solvents

Unless precautions are taken, troublesome skin injuries may result from the constant handling of most of the commonly used organic solvents, including gasoline, naphtha, benzene, turpentine, trichlorethylene, and carbon tetrachloride.

It is best, whenever possible, to so arrange work that workers do not come into direct contact with solvents; if this cannot be done, gloves, sleeves, and other protective clothing may be provided. This clothing must be made of a material that is not attacked by the solvent in use, and it is, therefore, important to state which solvents are in use when purchasing protective clothing.

The use of gloves may be objectionable, however, either because they are inconvenient or because they themselves irritate the skin. In this case, the most satisfactory expedient is to cover the hands before work with a protective cream. Several proprietary protective creams are available, each adapted for use with certain types of solvents.

After work the hands should be cleaned with a mild soap containing, if necessary, a synthetic detergent and an abrasive that softens in water, such as corn meal. Strongly alkaline soaps, sharp abrasives, and solvents should never be used. After washing, it is well to apply an ointment consisting of 50 per cent cold cream and 50 per cent lanolin.

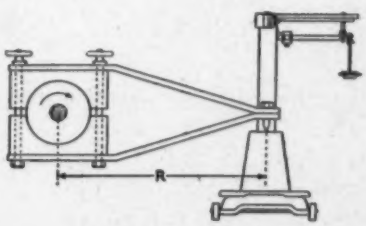
The foregoing applies to normal workers, but exceptional cases may be found. Some persons seem immune to the action of certain solvents, while others may be so sensitive to a specific solvent that the slightest contact with it will cause widespread inflammation of the skin. It is also possible for workers who were originally normal or immune to become sensitive during the course oftheir work.

Apparent sensitivity of a worker towards a given solvent can be verified by a patch test, which must be made by a physician. Persons abnormally sensitive to solvents should not be given work involving their use.—SAFETY RESEARCH INSTITUTE.

◆

How Are Output and Efficiency Of a Motor Determined by Test?

The mechanical output of a motor is most commonly measured by means of the Prony brake test. As shown in illustration, this brake consists of two blocks shaped to fit around the pulley of the motor. By means of two long bolts with handwheels at the top the pressure of the blocks against the pulley can be varied.



Two bars fastened to the top and bottom of the brake form an extension arm by which the torque of the motor is exerted upon the platform scale. The force factor F of the torque is measured as the net reading on the scale in pounds; the radius factor R is measured in feet from the center of the shaft perpendicularly to the bearing point on the scale.

The mechanical power of the motor

equals its torque times the distance through which it operates per minute or

$$P = \frac{T \times 2\pi \times rpm}{33{,}000}$$

where P is the power in terms of horsepower, T is the torque (= F X R) in pound-feet, $2\pi = 6.2832$ (the ratio of the radius to the circumference), rpm is the speed in revolutions per minute and 33,000 is the number of foot-pounds per minute equivalent to one horsepower.

As an example we may take a test of a 40-horsepower motor, for which the force was 55 pounds, the radius 2.5 feet, and the speed 1,440 rpm. The power then delivered was

$$\frac{55 \times 2.5 \times 6.2832 \times 1{,}440}{33{,}000} = 37.7 \text{ hp.}$$

To find the efficiency we must measure (by means of a wattmeter or other suitable method) the input to the motor at the same time that the output is determined. Both output and input are then converted to the same units, preferably watts, and the efficiency found by applying the following formula:

$$\text{Efficiency in per cent} = \frac{\text{Output}}{\text{Input}} \times 100.$$

A more accurate method is to use either a dynamometer for measuring the output or to calculate the efficiency by the loss method as established by the American Institute of Electrical Engineers (A.I.E.E.).—FAIRBANKS, MORSE & Co.

◆

General Care of Portable Electric Tools

To keep wear at the minimum, lubricate all tools regularly. Use only the lubricants recommended for each and use exactly according to instructions. Clean gear cases periodically with kerosene and then refill to the proper level with the proper lubricant. *Correct lubrication is the best insurance against gear and bearing failure!*

In highest quality tools, gearing calls for little more than proper lubrication and infrequent but regular inspection.

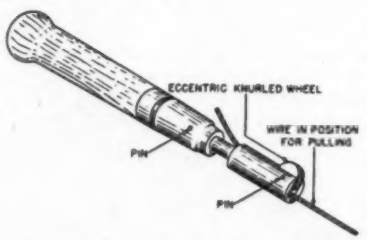
The care of high-grade electric cord is extremely important now because it is made of both rubber and copper and cannot easily be replaced. Keep cords free of grease and oil which cause rapid deterioration of the rubber. Avoid kinks, sharp bends and unnecessary bending to prevent breaks in the wire. Never lay cords over sharp bricks, stones or rails which could fray or cut the cover. When cable must be laid where wheelbarrows or trucks cross, it should be protected. Do not carry tools by the cord or jerk the plug from outlets. When tool is not in use, the cord should be carefully cleaned and coiled—never kinked or wadded—into its storage place.

For satisfactory operation, portable electric tools must have full voltage under load, an impossibility when under-size extension cords are used. For instance, a 200-ft. 18-gauge cord will operate a ¼-in. drill at maximum efficiency, but it will not operate a 9-in. saw because of the greater power requirements of this unit. Use proper gauge cord and avoid the danger of serious drop in voltage and of motor burn-out.—SKILSAW, INC.

◆

Slip-Proof Wire Puller

An easily constructed wire puller, devised by Carl Schreck of General Electric's Schenectady Works Regulator Division, has improved the method of tightening locking wires. The puller is easier to handle and much safer than the conventional method of tightening wire with pliers.



A knurled, eccentric wheel ⅛ in. thick and ½ in. in diameter is the secret of the new device. It is mounted in a piece of drill-rod with a milled slot to accommodate both the wire and wheel. The wire is threaded into the slot and under the wheel which is then rolled back toward the handle to apply pressure on the wire. The grip is automatically increased as the operator pulls the tool to tighten the wire.

The drill-rod is approximately 2½ in. long of ½ in. stock. The shank end, however, is turned to a ¼ in. diameter and is fitted and pinned in a wooden handle. The pin, knurled wheel, and rod should all be hardened.—GENERAL ELECTRIC CO.

◆

Setting Up a Ladder

1. Select a ladder with suitable safety feet; otherwise, block or tie the base, or have someone hold it.
2. Be sure rungs and side rails are in sound condition.
3. Place ladder feet parallel with wall or other solid backing. It is unsafe to rest a ladder against loose boxes, round objects, or other insecure backing, unless it is tied so that it cannot fall.
4. The best angle for a ladder is about 75 degrees with the horizontal. (Note diagram.) Have the distance "B" about ¼ of the ladder length "A". In other words, place the base of a 12-foot ladder 3 feet from the object it leans against.—*Safety Instruction Card No. 16*, NATIONAL SAFETY COUNCIL.

◆

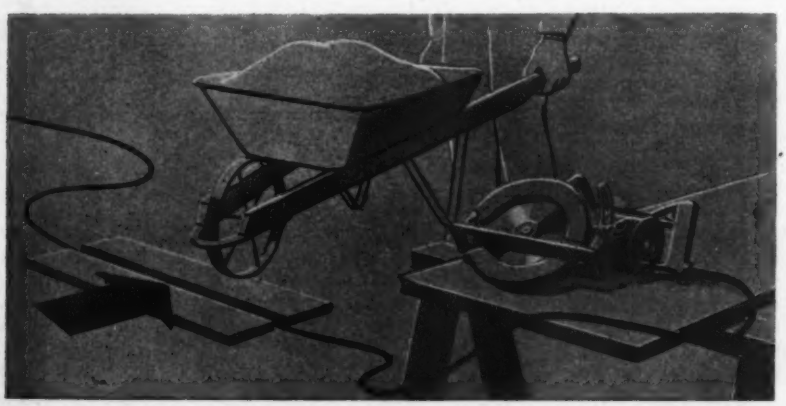
Cleaning a Heat Exchanger

A heat exchanger, to provide anticipated thermal results, must be kept properly cleaned. The following methods are suggested for such an operation:

1. For water soluble deposits—Flush with warm water.
2. For soft, water insoluble deposits—Circulate with hot wash oil or light distillate through the tubes and shell at a good velocity, follow by thorough washing.
3. For sludges or cokes—Should neither Item 1 nor 2 produce satisfactory results, use a reliably recommended cleaning compound.
4. For hard scale—Should the scale not yield to the previously mentioned treatments, then a chemical analysis of the scale might be advisable. Such analysis may indicate that careful washing with a dilute mineral acid and inhibitor, followed by thorough washing, would provide the required results. A mechanical cleaner, preferably a wire brush, can advantageously be employed, but care should be exercised to prevent the cutting or scoring of the tube wall.

Frequent cleaning is important to prevent excessive deposits on the tubes, since these deposits may result in plugging the tubes.

Resultant overheating may be followed by leakage of the expanded joints or result in other damage and certainly in a reduction of thermal capacity. In cleaning, however, the following "Do Nots" are well to remember:



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1. *Do Not* introduce steam into an individual tube, as such a practice causes differential expansion strains with possible leakage at the tube joints.

2. *Do Not* introduce air into units handling inflammable fluids.

3. *Do Not* open the unit until it has been completely shut down, drained, and all pressure released.

When inspecting, cleaning, or removing the tube bundle or shell, observance of the following is important:

1. To clean or inspect, it is only necessary to remove channel covers (that is, with a two-piece head; with a one-piece head, remove head itself), and in the floating head design, remove the shell cover and floating head covers, also.

2. To locate tube joint leaks:

(a) In fixed tube sheet units—remove channel covers and apply fluid pressure on the shell side.

(b) In floating tube sheet design—remove the front channel and apply hydrostatic pressure on the shell side and any leaks between tube and front tube sheet will immediately be evident; should a major leak occur in the rear tube sheet, the fluid will shortly be seen running out the bottom row of tubes. If a test ring is purchased with the exchanger, remove the shell cover and floating head; then attach the test ring. The pressure then will show up any leaks in the floating tube sheet. Minor leaks may require the removal of the tube bundle and the application of a pressure test on the tubes.

(c) In U-tube units—remove channel, and test from the shell side. (Caution: Be sure that all bolted contact surfaces are securely bolted with all bolts in place and properly tightened.)

3. To remove the tube bundle, the joint should first be broken with a chisel, being careful not to injure the gasket surface, and the bundle should then be pried out, using a chisel or a crowbar. Where the resistance to removal is great, a pair of hydraulic jacks, placed diametrically opposite on the periphery of the tube sheet, may be employed.

To remove a straight tube—floating tube sheet bundle, either of the above methods may be used, or steel cables may be threaded through several tubes, tube diameter permitting, and pulled—the cable should be passed through a wooden block at the tube ends to protect such tube ends from damage.—The Whitlock Mfg. Co.

◆

Honing of Paper Knives

After paper knives are ground, they should be honed very thoroughly. By using a fine, soft grit wheel in the grinding operation, the honing time can be cut to a minimum. A knife that is carefully and properly ground and honed will give much longer life and much more satisfactory service in every way. An 8-inch Indian oil stone can be used to good advantage; the better the hone used, the more economical and satisfactory it is in the long run.

Place the knife on a block at the proper angle as shown in Figure E and hone with a circular motion. It must be emphasized that one cannot be too careful in this operation. Every bit of "wire burr" must be removed from the cutting edge. A good way to do this is to pass the hone underneath, on the face side of the knife, being very careful not to "dub" this side of the cutting edge. One way to determine whether all of the "wire edge" or "burr" has been removed is to draw a handful of cotton waste along the edge of the knife. If the edge has a tendency to cut the waste, there is still a "wire edge" that should be honed. If there are still some fine nicks present, the waste will be caught at these plates. This seems rather a crude way of testing but it has proved effective. If the grinding is not carefully done, the honing operation will be difficult and the final results will not be satisfactory.—*John Greenwood*, The Paper Industry and Paper World, 20, No. 3 (June, 1938).

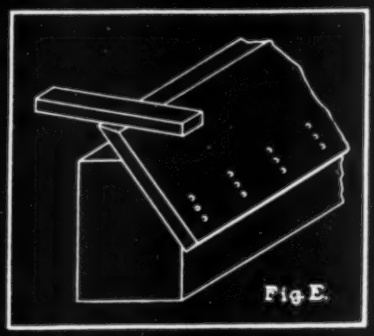

Fig E.

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Conditioning Procedure for Cotton Supercalender Rolls

A conditioning procedure for cotton (supercalender) rolls, suggested by one roll manufacturer, requires 32 hours to complete. In this instance, the rolls are conditioned with a very dilute solution of grain alcohol in water, the solution being made up in the proportion of one-half pint of alcohol to ten gallons of hot water—the solution being as hot as the hand can stand.

During the first two hours of conditioning, the rolls are run at slow speed and with only the weight of the rolls for pressure. Likewise, the stack is run dry at the start only long enough to make sure that everything about it is mechanically satisfactory. As soon as that fact has been determined, the rolls are sponged lightly with the alcohol-water solution, beginning at the top and working downward. This sponging or wetting-down operation can be continued until the rolls feel slightly tacky to the hand. It should be stopped short of any tendency of the rolls to slip or spin. Sufficient conditioning solution should be used to form a solid ribbon about 1/8 to 1/4 inch wide at each nip for two minutes. Likewise, the ends of the roll faces should be wet a shade more than elsewhere. Then, too, during this initial two hours of conditioning, the rolls should be wet down every twenty or thirty minutes.

During the succeeding four hours, the stack should be kept in operation at slow speed, and the rolls continued to be sponged every twenty to thirty minutes. At the beginning of this conditioning period, only enough weight should be applied to the rolls to pull them lightly together, about one-fifth of the full pressure possible. Then the pressure should be increased about 100 lb. every hour until it totals one-third of the maximum pressure obtainable when all weights are applied.

The procedure for the next two hours is divided equally as to time. For the first hour, the rolls should be run as wet as they will stand short of slipping; the second hour, to dry out before stepping up speed. During the two-hour period, pressure should be maintained at one-third of maximum.

For the next twelve hours, the rolls should be run at high speed. Pressure for the first two hours should be about one-fifth of maximum. It then should be built up gradually every half hour during the next two hours to about one-third of the maximum available. From the end of the fourth hour onward, the pressure should be increased gradually until, at the end of eight hours of running time, it amounts to about one-half of the maximum available. At this pressure and speed, the rolls should be wet down, then run up dry, and the procedure repeated alternately every half hour for the remaining four hours of the twelve-hour period.

A roll temperature of 140 Fahr. is sufficient for conditioning. Should the temperature rise above 180 Fahr., the maximum safe temperature for cotton rolls, the stack should be slowed down and the pressure reduced. Uniformity in temperature across the face of a roll also is important. In local areas where temperature is high, use more conditioning solution.

New cotton rolls tend to enlarge slightly or fill out at the ends during conditioning. Therefore, the ends should be watched and sanded, if necessary, to keep roll faces perfectly level.

The last twelve hours of conditioning should be carried out with the rolls continuing to be operated at high speed. Roll pressure should be increased every hour for eight hours to just below the maximum and there maintained for the remaining four hours.

During the entire period, conditioning solution should be used sparingly; the ends of the rolls should be watched; and the ends sponged more than elsewhere. In general, an effort should be made to dry up the roll surface a little, avoiding the least sign of sogginess at this speed and pressure.

Roll temperature as in the previous period should not exceed 140 Fahr. unless the conditioning is not progressing fast enough. Should such be the case, the temperature might be allowed to rise to 180 Fahr. At the higher temperature, however, it is necessary to sponge the rolls off more often and to watch them more closely for uneven temperatures.—*William R. Stapley*, The Paper Industry and Paper World, 23, No. 8 (November, 1941).

Review and Preview of the Paper Industry*

D. CLARK EVEREST
President and General Manager
Marathon Corporation

▶▶▶ WHEN ONE UNDERTAKES to make a review and a preview of the paper industry at this time he finds that the review is comparatively easy but the preview must be based on his knowledge of the industry and his individual analysis of all that has been written on the subject and his own thought of things that are to come. Perhaps one sticks his neck out in predicting the future but that has been done before by many people and in response to the request of some of the members of your organization, I am about to do it again.

In the matter of the review, I find that at the time I entered this industry in 1900 the amount of paper production was about 2,250,000 tons. This covered all grades including paperboard and practically all of the newsprint then used in this country. Importations were negligible. Canada's newsprint production and importation did not affect our situation until nearly fifteen years later. During the period from 1900 to 1915 production increased at the rate of about one million tons every five years. At the end of 1915 we were producing approximately five and one-half million tons per annum. During the five years from 1915 to 1920 this jumped up to slightly over seven million tons in 1920. In 1921 there was a recession to five and one-half million tons. From 1921 to the end of 1929 production doubled, reaching a peak of about eleven million tons in 1929. From 1929 to 1932 there was a constant decline, production reaching a low of eight million tons in that year. From 1932 to 1937 there was a constant increase reaching an all time high of twelve and three-quarters million tons. In 1938 this fell off to eleven and one-half million tons. From 1938 to 1941 there was a steady increase with a peak all time high of seventeen million seven hundred sixty-two thousand tons.

Since 1941 and continuing at the present time, the rate of production has been from seventeen to seventeen and a quarter million tons. The last three years have been at the average rate of 294.5 pounds per capita consumption including imports, particularly newsprint from Canada. In 1937 the rate of consumption in the United States was 248 pounds. At that time the United Kingdom was 153 pounds, Germany 103 pounds, France 36 pounds, Italy 26 pounds, and Russia 12 pounds. The consumption per capita in the Soviet Union is a matter to which I will refer later in this talk.

Another interesting bit of information to be gained by a review of the industry is the number of paper machines which have been in operation at various times over the last forty-five years. In 1899, there was 1232 paper machines in operation with an annual capacity of 2,782,000 tons. In 1940 there were 1592 machines with an annual capacity of 17,000,000 tons. During the period from 1920 to 1929, inclusive, there were 347 machines installed with an annual capacity of 5,164,000 tons. From 1930 to 1939 there were only 91 machines installed with an annual capacity of 2,545,000 tons. From this you will note that the machines installed during the 1920's had an average annual capacity of only 14,880 tons, whereas those installed during the 1930's had an average annual capacity of 28,000 tons. Much of this is due to the fact that the more recent installations were in the Kraft field in bag, wrapping and board where capacities are relatively high. During the period 1928 to 1938, inclusive, 244 paper machines were dismantled.

There have been some machines installed since 1940 and we now have somewhere between 1600 and 1610 machines in operation with an estimated annual capacity of 18,000,000 to 18,500,000 tons. This figure is one to keep in mind when we start on a preview of the industry.

One of the most remarkable increases in use of any product has been in kraft board. In 1926 I recall that there was less than thirty thousand tons of kraft liner board produced and as I was one of the first producers I was told by several of the gentlemen who are now the largest producers of this product that there would never be any substantial quantities of kraft board used as it could never compete with jute board using waste papers as a base. They said it was uneconomical and would never have a place in the picture. I note, however, that there were 1,553,000 tons of kraft liners and corrugated used in 1944.

I find that the production of all types of container board and box boards have increased from 4,555,000 tons in 1935 to 7,922,900 tons in 1944.

The most significant factor in all of my work in reviewing the past history of the industry is in wood pulp production and this to my mind is the most important thing to consider in any preview of the industry, along with the pulpwood supply which is behind it.

In 1900 there was slightly over one million tons of all kinds of wood pulp produced. In 1942, we were producing over ten million tons, with a potential productive capacity of twelve million tons. Imports have averaged about one million two hundred thousand tons for the last four years which indicates an apparent consumption of all grades foreign and domestic, of between eleven and twelve million tons.

As a matter of review of the paper industry during the war years, I would like to inject a little personal history and how the defense program and later the war program was developed. You will recall that until about June 1, 1940, nothing of any consequence had been done on a defense program, in fact, practically all of the appropriations for this work were not made available until after July 1, 1940.

I joined the staff of the Advisory Commission to Council of National Defense September 5, 1940. The Council of National Defense was made up of the Secretaries of War, Navy, Interior, Agriculture, Commerce and Labor. The Council of National Defense adopted, subject to approval of the President, certain rules and regulations for the conduct of its work. Among other things it provided for an Advisory Commission of seven. This was made up as follows:

E. R. Stettinius, Jr. . . Industrial Materials
Wm. S. Knudsen . . . Industrial Production
Sidney Hillman . . . . . Employment
Chester Davis . . . . . Farm Products
Leon Henderson . . . . Price Stabilization
Ralph Budd . . . . . Transportation
Harriett Elliott . . . . Consumer Protection

Mr. Stettinius' department of Industrial Materials was divided into three industrial groups:

A. Mining and Mineral Products
B. Agricultural and Forest Products
C. Chemical and Allied Products

Because of its dependence on wood as a primary raw material, the pulp and paper industry was placed in "Division B Agricultural and Forest Products." These divisions were broken down into subdivisions and I served as group executive of the pulp and paper subdivision.

These executives met frequently as a Board of Directors and an attempt was made to locate all the bottlenecks in material supply. We were told that defense demands were to be superimposed on civilian demands and that we were to provide for both. The difficulty was to find out what were the defense, lend lease and later the actual war requirements.

At first we were told we were to have an army of 450,000 men. Then came the revisions 750,000, 1,000,000, 1,250,000

*Presented at the June 18 (1945) meeting of the Chicago Professional Paper Group.

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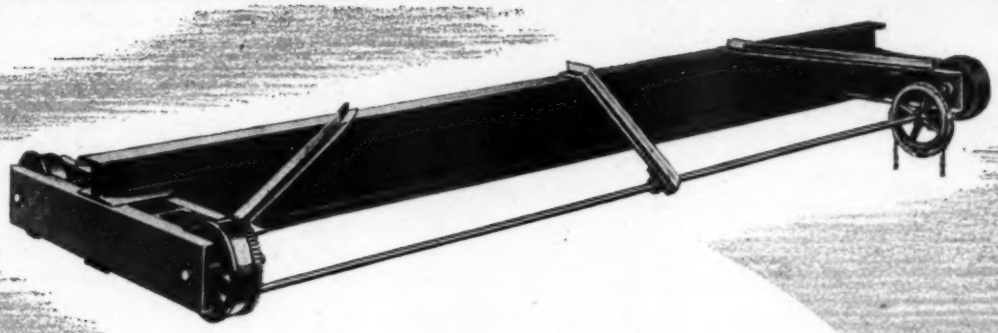

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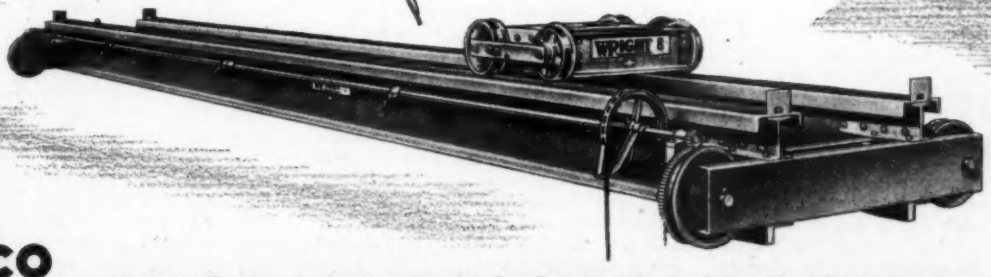

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and so on until we now have approximately 11,000,000, in the armed forces, You can imagine what headaches we went through trying to keep up with revisions in requirements. What was an ample supply for an armed force of 750,000 became a distinct shortage for a force of 1,500,000. All of this time we were trying not to disturb civilian needs. Soon the figures ran into millions of men and the programs were changed accordingly. In the pulp and paper division my difficulty was to get anyone to survey their requirements and give me any kind of a figure to shoot at. No one seemed to pay any attention to their paper needs until they were right up against it. I had an exceptionally good staff of advisors and statisticians and our estimates of production requirements made in December 1940 for 1941, which was the peak production year of all time, were 17,500,000 tons of all grades of paper and paper board. The final result for that year was 17,762,365 tons. During that year all inventories of pulp and waste papers were badly depleted and we have been unable to reach that figure since, due to lack of materials.

One thing which I think was poorly handled in the early days of the program was the placing of waste materials or as they were called "secondary materials" under the direction of the "primary materials" producers. For instance "iron and steel scrap" under steel, "waste papers and rags" under pulp and paper—and so on down the line. It was my thought then and still is that the so-called "secondary materials" industry, or what we had previously known as the Waste Materials industry should have been maintained. As it worked out under the plan adopted that industry gradually lost its manpower and we were compelled to resort to all sorts of "whooptedoo" campaigns to bring out these waste materials. This resulted in great confusion and in waste paper particularly we were unable to get the maximum value due to the fact that only a limited number of concerns had sufficient help to assort their output. I am hopeful that postwar the waste material industry may be re-established and these products permitted to flow through the regular channels as in prewar days.

In reviewing our war experience in the pulp and paper industry, I think we have fared better than almost any other industry. Starting with one of the most complex industries in American business we were one of the first to work out a fair price basis for our basic raw material—woodpulp. I think great credit is due to Thomas B. McCabe, who then represented Pulp and Paper Materials Division, and George Renard of the Price Stabilization Division, for their foresight in adjusting prices of pulp on what was then a fair and equitable basis.

There was comparatively little trouble in the industry in filling war needs as soon as the principle of equitable sharing of war demands was developed. When M-241 was amended to provide for the various percentage reservations for government use most of the troubles disappeared. Prior to that time there was constant bickering over filling these orders. Everyone had all kinds of brilliant ideas as to why such orders could be made to better advantage in some other manufacturer's plant.

All in all, the WPB did a mighty good job in keeping the industry running. True, we were on the ragged edge sometimes for certain materials and repair items, but I know of no loss of important tonnage due to lack of these things. In the early days there was plenty of high pressure for exceptions but this finally worked out on a good co-operative basis with few disgruntled manufacturers registering continued complaints.

Probably the most difficult and complicated program was that of pulp allocation. Even with all of the complexities of that situation I believe it is now the consensus of opinion that no other scheme would have worked as well. It was fortunate that the plan was adopted while there were still fair sized inventories in the hands of the mills. If this had been postponed until inventories had been exhausted it would have resulted in a chaotic condition and one which would have been extremely bad from an economic standpoint.

Perhaps this review of the industry has been too long drawn out, but there were certain highlights which I thought should be brought out.

Now in considering the preview of this industry, I am inclined to agree with someone who recently said: "There may

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be some humps and hollows of minor importance following V-J Day but on the whole I am of the opinion that we are in for the longest sustained period of so-called prosperity ever known in this country."

Many things have happened in the last five years which I think justify this thought as far as the pulp and paper industry is concerned. If were were to accept the estimates of consumption in the postwar years as reported by several well known students of the subject, we would be dealing with figures ranging from twenty to twenty-five million tons annually.

Personally, I cannot agree that we will reach these levels for some time to come, due to bottlenecks which will take time to overcome.

The first thing which must be considered is pulpwood supply. You are all familiar with the many efforts made to increase the cutting of pulpwood. These have been effective to a certain degree, but the easy-to-get wood has come into the market and wood crops are not replaced over night. With the need for lumber for rebuilding the outside world and the housing programs in this country, we are faced with great competition for the available supply of men who will go into the forests and produce saw logs and pulpwood. There has been some mechanization in the industry which may help but there are also millions of young men who have been out of the logging locations for several years. They have seen a lot of country and it is questionable whether they will be content to engage in that type of work. They have probably seen all the camps they care for —for awhile. In my opinion the production of pulpwood will be the key to the whole business over the next five years. With the new plants contemplated in the south, the situation there becomes more complicated. If there is a building boom, the small portable saw mill, of which there are somewhere between fifteen and eighteen thousand in the southern states, will be a constant menace to pulpwood production. This type of mill is now cutting timber which should go into pulpwood and so long as there is a market for their kind of lumber in house building they will continue to cut four or five times as much board feet as is used in the entire pulp industry in the south. On the west coast the timber is pretty well allocated. The only way I see to increase that supply is by the utilization of small timber which will be logged in advance of their regular operations in big timber and which has heretofore been broken up and rendered useless through the felling of the larger timber. A study of this procedure is under way. Another help would be the liberalization of the policy of the Forest Service in selling timber and by blocking up of isolated second growth stands which can be put on a sound basis and justify the investment necessary to produce pulp. A good process for the manufacture of pulp from Douglas fir would also help to loosen up this situation.

The supply in the Northeast and in the Lake States region is diminishing and even with the efforts now being made in reforestation and approved forestry practices there is bound to be a gap in the production of pulpwood before the productivity of these regions can be built up.

With an estimated demand for 17,000,000 cords of pulpwood this year, the minimum rate at which I believe the demand will continue for a number of years, you can readily realize that the production of wood becomes our most important job and on it depends the success of the industry and its ability to meet the demand for pulp, paper and paper board.

The next factor to consider is woodpulp supply. After poring over all of the statistics and the articles which have been written on this subject, I have come to the conclusion that woodpulp requirements postwar will amount to 13,150,000 tons. Of this 12,400,000 tons will be required for domestic paper manufacture, 550,000 tons for non-paper uses and 200,000 tons for export. On the other side we have the supply factor which I estimate as follows: Domestic production 11,000,000 tons, less exports of 200,000 tons leaving 10,800,000 tons of domestic production to which should be added imports of 2,150,000 tons giving us a total for domestic use of 12,950,000 tons which is split up between paper use 12,400,000 tons and non-paper use of 550,000 tons.

In arriving at this figure of 2,150,000 tons of woodpulp imports there are many factors to be taken into consideration, but the best estimate I am able to make with the information I have—950,000 tons will come from Canada and the balance of 1,200,000 tons will come from overseas.

There has been much discussion of a flood of imports from Sweden. I cannot get excited about this situation as far as having an adverse effect on this industry. As a matter of fact, we need all the pulp we can get from overseas. It would help out in a situation which I think may grow worse instead of better over the immediate future if we are to take care of civilian requirements in the wrapping and packaging of civilian food as WPB releases materials for manufacture.

In 1939 Sweden exported 2,569,000 tons of all kinds of pulp. As Dr. Charles Roos of the Econometric Institute has pointed out, "before the war European countries depended on Sweden for regular shipments. Their needs for Swedish pulp will be greatly increased after the war in comparison with the prewar period, both because their inventories are low and because the need for consumers' goods will be great. Large quantities will be required not only in Britain but also in Denmark, France, Belgium, and Holland, and other countries, and it appears that Sweden is the only country which will be able to start deliveries of pulp immediately after the war."

Another factor will be the increased use in South American countries. Few realize the increased industrial activity in Brazil and other South American countries. Much of this new industrial development is now in operation and more is coming in as construction materials are available.

As to the immediate propect of Swedish imports, I have been informed through a reliable source that only thirty ships have been assigned by the "shipping pool" for delivery of woodpulp to the United States during July, August and September of this year. The maximum carrying capacity of these ships is 150,000 tons and part of the cargo space is to be given over for bringing in high grade ore. It is thought that if we receive 100,000 tons of pulp we will be doing well.

This same informant says that owing to fuel shortage in Sweden that there is a possibility of the government taking over from 25 per cent to 50 per cent of present pulpwood inventories for use as fuel which may cut from 225,000 tons to 125,000 tons of Swedish pulp per month for export. Presently there is a chlorine shortage in Sweden and this may affect the Swedes' ability to continue delivering bleached pulp until this shortage is relieved. Prices will be at ceilings for grades comparable with United States and Canadian production with increases for special pulps not made domestically. Ocean rates will be fixed at $8.00 per ton as against $4.50 to $5.00 per ton prewar. Total delivered prices will depend on inland freights.

The war has caused a complete re-shuffling of the whole pulp picture. Finland has lost a substantial percentage of productive capacity. There has been severe damage and over-cutting in its forests and finally in all probability its whole exportable output will be taken as reparations

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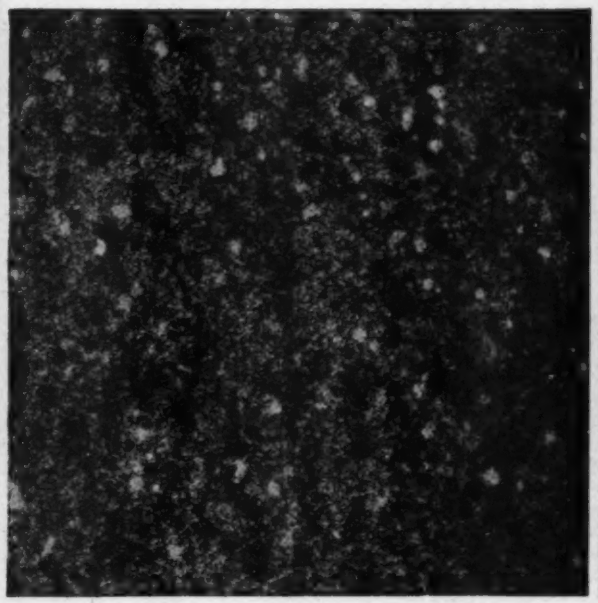
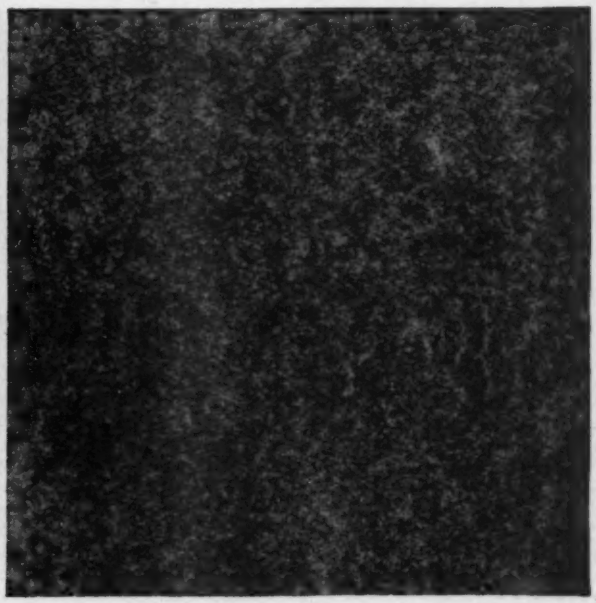


• *Micro-photograph of sheet (furnish 40% sulphite and 60% soda) prior to incorporation of NOPCO-KF. Note the extremely uneven transmission of light indicating poor sheet formation.*



• *Micro-photograph showing resultant sheet after NOPCO-KF was added to the fan pump of the paper machine (absolutely the only furnish change). Uniform formation is shown by even distribution of light and dark area.*

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by Russia. Norway has suffered severely in loss of timber and in damaged plants. Germany has also lost much of its pulp producing capacity, particularly in Aschaffenburg and in the Waldhof group of mills. Probably many other paper mills have been damaged in other areas. Another phase of Germany's plight is the great overcutting of forests during the war which means much less cutting over the next ten years in order to re-establish their cycle of cutting on a sustained yield basis. There is also the probability of considerable labor shortage in the industry postwar. Russia, in my opinion, will become an industrial nation of no small proportion. Prior to the war, through its compulsory educational program, it was making strides percentagewise in its increased use per capita. This program continues at an even greater pace and there is no question but that its conversion from the maufacture of war material to consumers' goods will mean a terrific increase in the use of paper and paper board for packaging. They know all about corrugated and solid fibre boxes and other items and my thought is that the Soviet Union will show the greatest increased use per capita within the next ten-year period, of any country on earth including our own.

I am unable to get any information on the Czecho-Slovakian pulp industry, but undoubtedly it has been upset in many ways. Sweden's main difficulty now is coal supply. After careful consideration it seems to me that Sweden will be the only source of imports from overseas for sometime to come. It is also significant to note that during the war period several Swedish mills have installed bleaching equipment, particularly in sulphate mills and the tendency will be to furnish higher grades of sulphate pulp rather than the highly competitive grades of unbleached sulphate or kraft pulp. In view of all these facts if this country is to get 1,200,000 tons of all kinds of Swedish pulp, I shall consider ourselves rather fortunate.

As to paper and paper board domestic productive requirements, there have been many formulas advanced for predicting what these will amount to. After considering all of these I believe that a safe estimate of domestic productive requirements can be set at 17,400,000 tons. Of this 17,000,000 tons is for domestic use and 400,000 tons for export. This is somewhat less than most people are forecasting. Here are my reasons. By and large the amount of paper required in the United States will depend upon the nature and level of the general economy. People talk of a one hundred twenty-five billion dollar economy which means in terms of gross national product and is the Department of Commerce's unit of measurement. I think that level will be maintained for a two or three year period after the war but then I feel that we will be vibrating around between one hundred and one hundred ten billions. An economy in this range means a non-durable goods and service portion of about seventy to seventy-five billions. The rest will be made up of durables and government expenditures which are not directly convertible into consumers' goods.

The bulk of the use of paper occurs in the lower range of the economy, that is, in connection with the items which people have to buy to maintain life, or in other words, the "consumer goods field." As the economy steps up and money becomes available for the purchase of durable goods, the associated use of paper decreases per unit of dollar expended. For instance, in 1932 when the economy was practically restrained to the non-durable goods and services, something over two million tons of paper were used per ten billion dollars of the total economy. In 1928 and 1929, and again in 1937 when durable goods made up about 25 per cent of the economy, paper use was actually under one and one-half million tons per ten billion dollars of the economy. A balanced economy in the United States on the basis of 100 to 110 billion dollars would mean a consumption of about 1.5 to 1.7 million tons which accounts for my estimate of the 17,000,000 ton production figure postwar.

It is my thought that there will be many upsets in grades and uses postwar. During the last five years, through the efforts of the technical staffs, there have been many new developments in grades and processes. Many of these new products have not been available for civilian use. When these are available there will be many substitutions of these new products for those in the old established lines. I believe that the use of waste paper both in paper and paperboard will decrease from the high peaks of consumption we have known over recent years. Kraft board, for instance, will make further inroads on jute board. Folding and set-up box grades will probably be changed requiring more virgin pulp and less waste paper.

With the advent of more bleached sulphate pulp in the south and mid-south, I visualize a gradual regional shift in the manufacture of book, number four bond, tablet, envelope and similar papers. Machine coated book will play a very important part and with bleached sulphate pulps and bleached groundwood available, the filled book papers may have a rough time. I do not look for any material increase in sulphite papers either in bleached or unbleached. The cost of wood which can be utilized in making bleached and unbleached sulphate papers will be the deciding factor.

During the next ten years I believe we will see a greater shifting of grades than in any previous ten-year period. Following the last war we went through a ten-year shift period which was largely caused by increased production of unbleached kraft. The nineteen thirty to forty period saw further increases in kraft paper and board and was the lush period for converters in building up and extending the packaging field. Our war experience has brought about developments which will give us another period of readjustment. This will come in many fields but more particularly those in which bleached sulphate may be utilized. My guess is that except for some grades such as newsprint and rag content papers, our pre-war grades will not be recognized ten years hence. There will be many improvements in processes and in products. It will pay those of you who are engaged in the technical end, both in paper and in the materials which enter into paper manufacture, to keep up with the procession. Every laboratory and every technician in every laboratory is working continuously for product improvement. I am reminded of an old Arabian proverb which says: "All mankind is divided into three classes—those that are immovable, those that are movable and those that move."

While, as I have indicated, I believe there will be a great demand for paper and paper products postwar, nevertheless the cream of this business will go to those who are in the third classification of the old proverb, "those that move."

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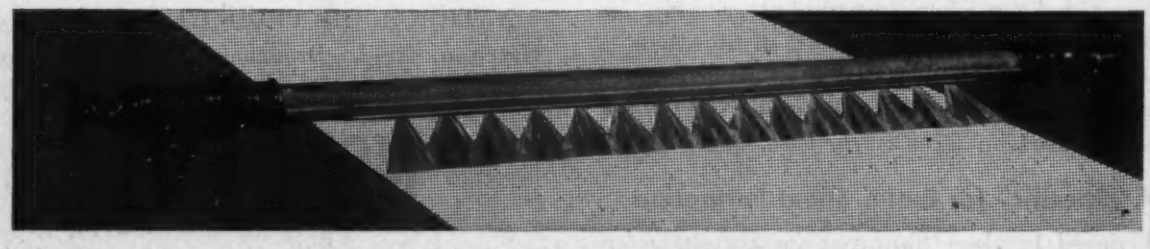

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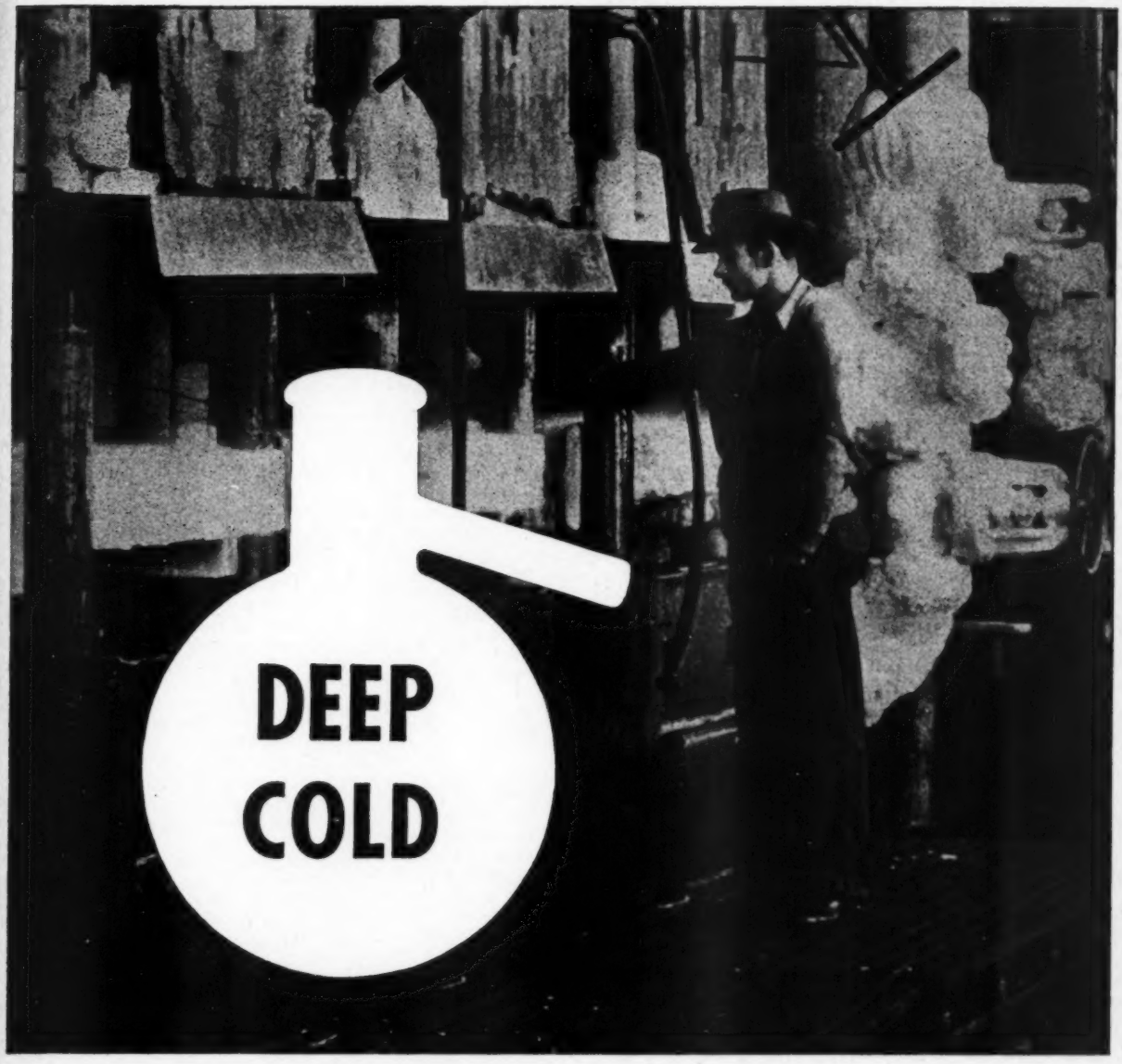

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Convention Papers . . . Abridged

The abridgments in this section are from papers presented "by title" at the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York City, February 19, 1945.

Modern European Pulp Bleaching

EDWIN C. JAHN, Professor,
New York State College of Forestry

The question, "What is new in European pulp bleaching?" is a large one and the writer does not pretend that he can answer it more than in part. The discussion will be confined primarily to Sweden and Finland, which countries the writer visited for some months during 1943 and 1944.

In visiting different pulp mills in Scandinavia, the impression is gained that there is great diversity in techniques and operation. Nearly every mill has its own innovations in plant design and technology based on the experience gained through the years and the ideas of the engineers at the plant. There are few standard bleach plant designs and these are usually modified to meet the conditions of the mill and the wishes of the operators. One of the well-known bleach systems, of course, is the Kamyr, of which several types are made. The proposed systems of the Finnish engineer, Kurt af Schultén, are described by him in an article in the *Paper and Timber Journal for Finland*, No. 7A, 1943. The Kamyr designs are described in a booklet put out by the company in 1943, commemorating 10 years of work in the bleaching field.

Bleaching in the newer plants is most commonly carried out continuously in a multistage process employing chlorine gas, alkali, and hypochlorite in a combination of towers and circulation bleachers. An after-treatment with sulphur dioxide is common. There is a tendency toward greater use of towers and less of circulating bleachers. Some Finnish mills planning new bleach plants are basing their systems on towers only but are leaving space for Bellmers if they prove needed.

The proposed constructions described by af Schultén, for example, include only towers for carrying on the various reactions, whether the bleaching is done batch wise or continuously. The equipment for the af Schultén continuous process includes the following: three chlorination towers with seven chlorination pumps and three chlorine mixing or absorption tubes; two alkali towers, each 25 cubic meters; two bleach towers, each 180 cubic meters; four vacuum washers for washing and filtering; three pulp pumps; five pulp chests; and one chlorine vaporizer with regulating valve and meter.

The total tower capacity is 440 cubic meters and represents a layout to handle 100 metric tons bleached sulphite or 75 metric tons bleached sulphate per day. No installations as far as known have been made employing this system, but it might be of interest to outline af Schulténs proposed process.

The first chlorine tower has a volume of 17 cubic meters, the second, 25 cubic meters, and the third is a narrow reaction tube. The chlorine mixing or absorption tubes are mixing chambers for the pulp and chlorine. The tube diameter increases for a short distance (¼) up from the bottom where the pulp enters from a pump. At the widest point, the chlorine gas enters. The tube then narrows gradually (upper ¾) and the mixture passes through a second pump and enters the bottom of the chlorination tower. The two alkali towers are designed leaning to minimize packing and make it easier to flush out.

The flow of the pulp through the above system is as follows:

Unbleached pulp, 2.5% consistency → Stock chest No. 1 → Pump → Chlorine absorption and mixing tube → Pump → To bottom of chlorination reaction tower No. 1 through which it passes upwards in about 6 minutes → Stainless steel vacuum washer where pulp is freed of acids and byproducts and concentrated to 22 to 23% consistency → Mixer, where caustic soda solution is added and the pulp heated up to 40 to 60° C → Drops into alkali tower No. 1 (tile-lined concrete or rubber-lined iron plate) through which it passes in about 1 hr. → Stock chest No. 2 equipped with circulation and to which water is added to bring the pulp to 2% consistency → Pump → Vacuum filter where washed and thickened → Stock chest No. 3 where pulp is now at 4% consistency → Pump → Second Chlorine mixing tube → Pump → Botton of chlorination reaction tower No. 2 through which it passes upwards in about 6 minutes → Vacuum filter → mixer, where caustic soda solution is added and the pulp heated → Drops into alkali tower No. 2 through which it passes in about 1 hour → Drops into stock chest No. 4 where water is added to bring to 2% consistency → Pump → Vacuum filter → Mixer → Stock chest No. 5, where pulp is 7% consistency → Pump → Third chlorine mixing tube → Pump, where a lime suspension or caustic soda solution is added to the chlorine-pulp mixture → Botton of reaction tower No. 3 which is a narrow tower, almost a pipe where a chlorine-hypochlorite bleaching sets in and at the top of the tower steam is added to heat the mixture to a suitable bleaching temperature → Pump → Bleach towers which are filled and emptied alternately and have dimensions such that the pulp stand in each of these two wide towers for 5 hours → Pump → to final washing, screening, etc.

The values for time and per cent consistency given above are those for a standard type pulp, presumably a strong sulphite, and would vary according to the type of pulp. According to af Schutlén, experiments indicate that the chemicals needed per metric ton of strong sulphite pulp of Roe No. 7 are 80 kg. liquid chlorine, 7.5 kg. sodium hydroxide, 5 kg. lime, and 1100 kg. steam. The pulp had a brightness of 89.5 PFI (about 83.5 G.E.). Strength values were comparable to those for the unbleached pulp.

Kamyr Continuous System

Kamyr bleaching equipment is installed in a number of Finnish and Swedish mills and in various combinations according to the product worked with and the degree of bleaching desired. The Kamyr chlorination towers, as is well known, have a drop leg or shaft through which the pulp falls to a circulation pump where the chlorine gas is admitted. The pump presses the mixture into the bottom of the tower tangentially to the wall, giving it a circular motion as it passes up the tower. The tower is built of concrete with acidproof lining. The pump and tower can handle consistencies of 2 to 5%, normally 3%. The most common dimensions are a diameter of 2.5 to 3.5 meters and a height of 12 to 18 meters.

Among some of the combinations used by some mills or planned are the following:

1. Chlorination tower, alkali tower hypochlorite towers in series.
2. Chlorination tower, alkali tower, hypochlorite tower, hypochlorite bleacher tanks, buffer tower. Chlorination tower, weak alkaline treatment and wash, second chlorination tower, wash, strong alkali tower, wash, hypo tower (and/or bleacher tanks), sulphur dioxide after-treatment tower.
4. Chlorination tower, alkali tower, second alkali (or equalizer) tower, hypochlorite tower, circulating bleach tanks after-treatment tower.

Mill Bleaching Methods

As previously stated, most mills have devised their own techniques for bleaching, based on the accumulated experience

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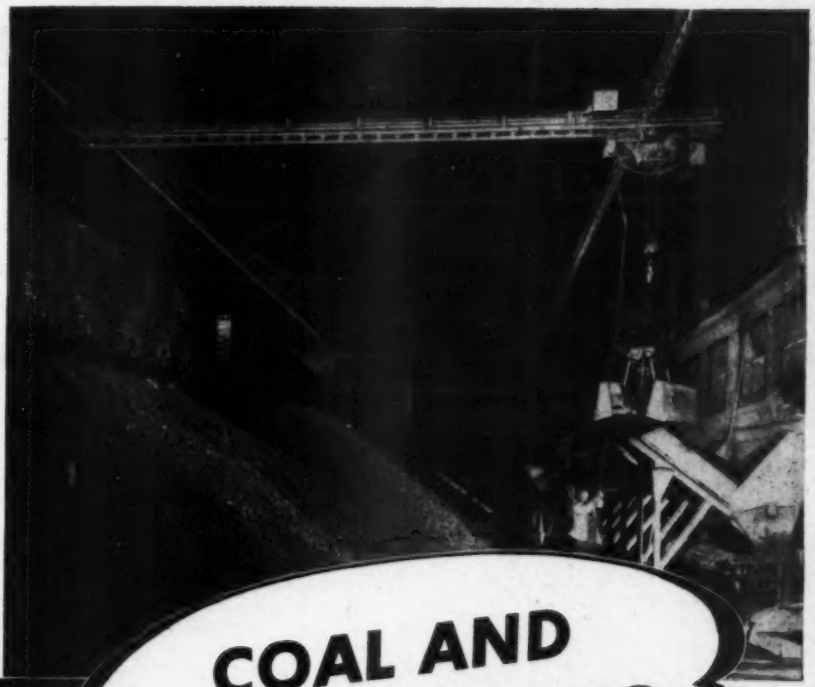
80 to 100 tons of coal are fed every 24 hours to the stoker hoppers of two 340 h.p. and two 560 h.p. boilers in this plant with a motor-driven floor-controlled Cleveland Tramrail crane and one-half yard single line grab bucket.



This bucket is ¾ yard size and carries ½ ton of coal. It is used as shown below.

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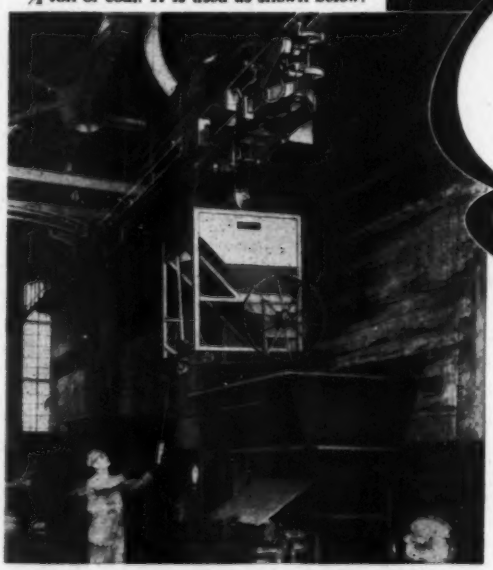

Buckets are rolled under discharge chutes of overhead bin or to outside coal storage and filled. They then are picked up and delivered to stoker hoppers by Tramrail System. Same equipment hauls ashes away.

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of their engineers with the products they produce. Even when standard equipment is purchased, it is usually arranged according to the ideas of the individual mill group. It is not possible, therefore, to describe a uniform standard bleaching practicein Sweden or Finland. Each is independent in some respect.

Bleaching Sulphite for Viscose (Staple Fiber)

It is general practice to treat with chlorine and alkali in towers. The hypochlorite stages may be in towers or circulating bleach tanks or combinations of both. Different mills employ from two to seven towers. For sulphite bleaching, the average operation usually consists of three to five stages. There appears to be a tendency toward a large number of stages and milder treatments at each stage. The consistencies at the different stages are normally 3 per cent during chlorination, 15 to 20 per cent during alkali treatment, and about 7 to 8 per cent at the hypochlorite stage.

The clorine is generally added to the pulp on the suction side of the pump and pumped into the bottom of the tower tangential to the wall or pumped through a pipe or mixing chamber and dropped into the top of the tower. One tower is most commonly used although sometimes a second tower follows the first. Pulp is removed from the bottom of a tower by the aid of a cutting rotating spray. The reaction is carried out at about 15 C. or less. For viscose pulp, the reaction time is about 45 to 50 minutes but varies depending upon the quality of pulp desired.

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For viscose pulps, the average chlorine consumption is 15 to 20 kg. per metric ton of pulp produced. After chlorination the pulp is generally washed with water only, although some mills first wash with dilute alkali.

The alkali is added to the pulp either in a worm screw mixer, in an agitated mixing tank, or partly on a vacuum washer and partly in a break and mixing trough. In the latter case the pulp from the chlorine tower passes over a compartment vacuum washer where it is first washed with cold water, then with warm water, and finally alkali sprayed onto the pulp mat. The pulp-alkali mixture may be cold, warm, or heated by steam to 90° to 110° C., depending upon the type of pulp desired. In most cases for viscose or paper qualities, the lower temperatures are used.

The alkali-pulp may pass through a compressing screw of the Kamyr type at the bottom of the tower and overflow at the top, it may pass slowly downwards by gravity, or it may stand for a period of time before being dumped by gravity. The alkali consumption at this stage is about 10 to 15 kg. per metric tons of pulp for an ordinary viscose grade.

Usually the pulp now passes to the hypochlorite stage. However, in some mills producing viscose and special pulps, the chlorine and alkali treatments are repeated in a second set of towers. For some paper pulps the alkali treatment may be omitted and chlorinated pulp neutralized with lime in a tower.

The hypochlorite treatment is carried out either in towers, in circulating bleaching tanks or in combinations of both. The process may be in one step using one tower, or one set of bleaching tanks, or in two stages using two towers, or a combination of a tower and bleaching tanks. The operation is normally carried out at 30° to 40° C., and for circose pulp, there is consumed 7 to 10 kg. of available chlorine and 2 to3 kg. of alkali for buffering per ton of pulp.

After-treatment for viscose and certain other grades is common. Sulphur dioxide is added to the pulp, either in a tower or a chest.

Bleaching High Alphas

For high alpha pulps, the bleaching steps are more intensive or more numerous than for viscose pulp. This is done mainly by increasing the temperature and intensity of the alkaline treatment. Instead of 20° C., the temperature may be raised as high as 110° C. for certain types, but usually not over 90° C. The alkali consumption may range from 50 to 100 kg. per ton of pulp depending upon the per cent alpha desired. In some cases, additional alkali stages (one or two) are introduced after a normal three-stage treatment with chlorine, alkali, and hypochlorite. A final chlorine dioxide stage may also be used.

Bleaching Sulphate Pulp

Generally speaking, the same type of equipment is used for bleaching sulphate as for sulphite pulp. The rate of flow of the pulp through the system is generally slower providing longer reaction times. The various constants are also adjusted to give the quality desired. A higher consistency of pulp during chlorination is desirable, namely about 4.5 per cent.

Various bleaching combinations are used, as well as different numbers of stages depending upon the whiteness desired. For certain paper grades the combination might be (1) chlorine tower, dilution tower, hypochloride tower or bleachers, or (2) the chlorine, alkali, and wash treatments may be repeated before the hypochlorite in a tower, followed by chlorine, alkali, washing, and a final hypochlorite treatment, or (4) some other combination may be followed.

The question whether it is better to begin the bleaching operation with an oxidative stage, namely hypochlorite, or to use it only at the end and begin with a strong chlorination is one which is frequently debated. Many engineers believe that a certain degree of oxidation at the beginning is best and that it alters the residual condensed or resinified lignin making it easier to remove subsequently. Hedborg in a study of the bleaching of sulphate pulp (*Svensk Papperstidning*, 46, 381-394, 1943) finds that treatment with hypochlorite before chlorination improves the removal of lignin, especially for pulps having high chlorine consumption. However, double chlorination seems to give better results when bleaching pulp or low chlorine consumption.

Chlorine Dioxide Bleaching

Much interest is manifested in Sweden, Finland, and Germany in the use of chlorine dioxide as a final stage in the bleaching operation of dissolving pulps, viscose, and high alphas in general. Some mills already are using chlorine dioxide and others are experimenting with it or are planning to use it.

The chlorine dioxide is used in an approximately concentrated aqueous solution. This is prepared at the mill by blowing the gas by air into an absorption tower. The gas is released from sodium chlorate by reducing the latter to chlorine dioxide and sodium sulphate.

Use of chlorine dioxide is claimed to have several advantages, namely (1) it removes the final lignin and improves the color of the pulp, (2) it improves the yield since it causes less loss than further hypochlorite bleach necessary to attain the same quality thereby saving perhaps 0.5 per cent alpha, (3) it reduces the quantity of chemicals needed in the hypochlorite bleach, (4) it makes the control of the bleaching operation much easier, and (5) it is believed that the reactivity of the fiber is improved.

The bleaching systems used in Scandinavia are, broadly speaking, relatively simple, involving combinations of treatment with chlorine, alkaline, and hypochloirte with or without an after-treatment with sulphur dioxide or a final stage with chlorine dioxide. The bleaching plants are generally laid out so that they are very flexible permitting the bleaching of different kinds and qualities of pulp by different methods in the same plant.

The bleaching operation is closely integrated with the other operations of the mill, particularly cooking to produce the

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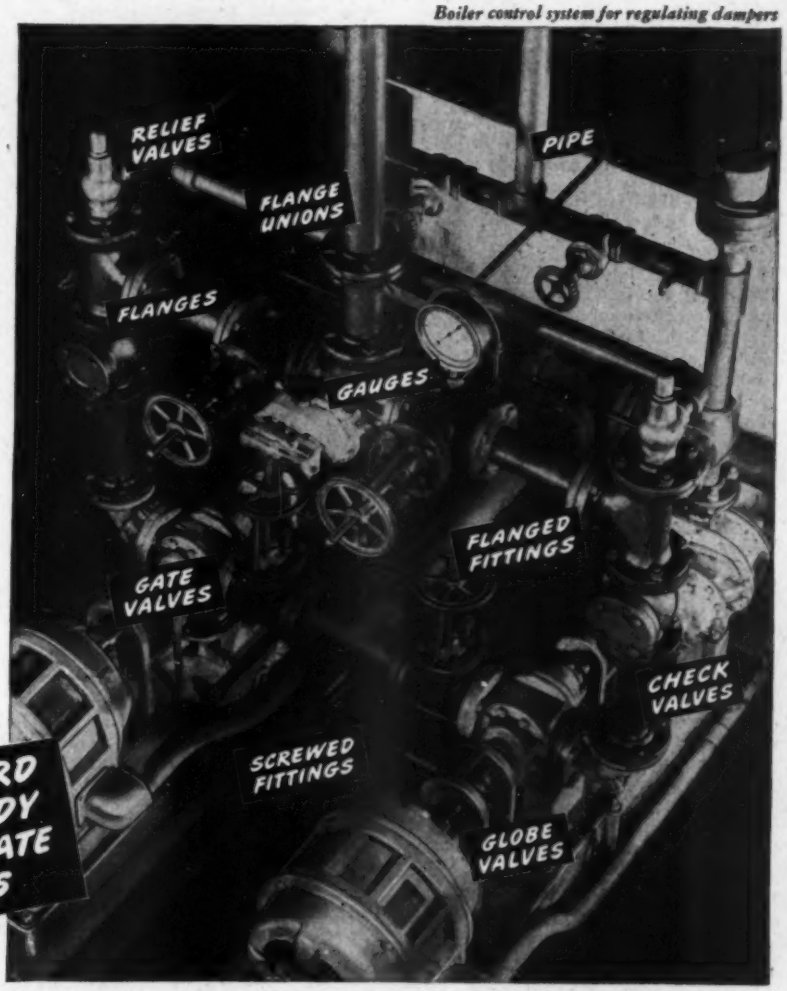

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best possible results. Selection of wood in the wood room and pulp screening are also part of the picture. Some mills use fractionating screening to remove fines, ray cells, etc., greatly reducing the resin content of the final pulp.

Pre-cooking wood with dilute sulphuric acid prior to sulphate cooking has developed in Germany and is receiving interest in Scandinavia. It is suited for producing higher alphas and is correlated with the cooking and bleaching operations.

The Use of Pyrodextrins in The Clay Coating of Paper

RALPH W. KERR and NOBERT F. SCHINK
Corn Products Refining Company

Kerr (*Paper Trade J.*, 115, no. 22, 30, 1942...(*Paper Trade J.*, 117, no. 15, 25, 1943), has discussed the chemistry of the starches with reference to sizing paper. It is assumed that the branched polymer fraction of starch is more suitable for the preparation of clay coatings owing to its greater dispersing effect (protective colloid effect) on clay and to its lesser tendency to increase in viscosity or to gel as the concentration in water is raised. The linear polymer fraction of starch has a negative protective colloid effect on clay in high concentration, tends to set to an irreversible gel and increases the plasticity particularly at the usual operating temperature.

The viscosity of solutions of both polymers are too high and a reduction by chemical modification is required before either is satisfactory in the preparation of clay coatings.

The above assumptions have been shown to be correct by experiments performed in these laboratories. To avoid the complications which may be introduced by chemical modification each corn starch fraction was tested in its unmodified state (Schock, T. J., *J. Am. Chem. Soc.*, 64, 2957, 1942). To obtain workable brush coatings which contained a total solids content of 45%, the ratio of starch polymer to clay was reduced to 5:100. Coatings of this composition which contained the branched polymer fraction were applied at room temperature. The coatings which contained the linear polymer set to a plastic mud and it was found necessary to apply it at 75 C. Under these conditions it was found that the *native* linear polymer had more adhesive value than the branched. In the former case, the coated paper gave a Dennison wax test of about 2; in the latter case, 0. At a ratio of 7 parts of branched polymer to 100 of clay, the mixture gave a coating which had a wax test still under 2. However, as the fractions were degraded (by acid) and then separated by fractional precipitation from a water dispersion of an acid hydrolyzed corn starch, it appeared that the linear polymer lost its adhesive value at a greater rate than the branched polymer.

On the assumption that the production of a modified starch which contains branched polymer components is desirable for use in clay coatings, a dextrinization procedure which minimizes the opportunity for hydrolytic degradation and is more conducive to condensation reactions has recently been developed.

The proportion of linear polymers present in the starch during the dextrinization procedure was followed by a potentiometric, iodine titration devised by Bates, French and Rundle (*J. Am. Chem. Soc.*, 65, 142, 1943), and modified by Schoch (*J. Am. Chem. Soc.*, 65, 1380, 1943), and by the spectrophotometric method of Kerr and Trubell (*Paper Trade J.*, 117, no. 15, 25, 1943). The results of our tests show that as the reaction proceeds, the per cent of linear polymers decreases progressively until finally, for the machine coating gums, the percentage is too low to be accurately determined.

Low density coatings vary from 35 to 50% in total dry solids, and high density coatings from 50 to 70%. Low density coatings are fluid enough to be applied with polished metal rolls, air knives, or brushes. The high density coatings are heavy bodied and the coating is often transferred to the paper by rubber rolls. These coatings are usually applied to the paper on the paper machine and they are referred to as machine coatings.

The special corn pyrodextrin or gum that has been prepared for brush coating applications is a light colored powder. It is soluble in cold water to the extent of 10 to 20%. When cooked to a paste or sol by heating 20 grams of gum in 100 grams of water to 95 C., and then cooled to 25 C., the relatively clear solution has a viscosity of 100 centipoises.

Brush coatings are conveniently applied at a concentration of 45% total solids and it is customary to use a ratio of about 15 parts of starch product to 100 parts of clay at this total solids concentration. Higher adhesion may be secured by increasing the ratio of the starch product, but the gloss of the paper is reduced. A coating may be prepared using the above-mentioned proportions of ingredients which are dissolved in 170 gallons of water and 100 pounds of clay or similar pigment is mixed in with stirring which is continued for 15 minutes.

The adhesive is prepared by cooking 150 pounds of the brush coating gum with 75 gallons of water. The temperature is brought up to 200 to 205 Fahr., and the paste is held at this temperature for 5 minutes. The continuously agitated cooked gum may be allowed to cool to 120 to 130 Fahr., or added directly to the clay slip and the mixture allowed to cool to operating temperatures.

The prepared adhesive is added to the clay slip, either in a tank supplied with efficient agitation, in a ball mill, or in other mixing equipment usually employed for this purpose. Thirty-four gallons of water are added to adjust the dry solids content to 45% during the mixing. Mixing is complete when the viscosity of the mixture approaches a minimum. During the final mixing period, suitable dyes may be added to tint the coating. For white coatings, the addition of 1 to 4 ounces of Voilet N, or a dye of similar color, per 1,000 pounds of clay is recommended.

The preparation of coatings which contain pigments other than clays may require some adjustment of the proportion of flux or wetting agent which is used in order to obtain a minimum viscosity. Different clays show some variation in the amount of flux required (Sheets, G. H., *Tech. Assoc. Papers* 25, 528, 1942).

The lower the density of the coating, the greater is the proportion of adhesive to clay required to obtain a specified Dennison wax test. This is shown by the following data. Thirteen parts of the brush coating gum added to 100 parts of clay has been found to give a coating with a wax test of 4 to 5 when applied at a total solids concentration of 50%. In order to obtain an equivalent wax test at a concentration of 45%, 15 parts of gum to 100 parts of clay were required and at

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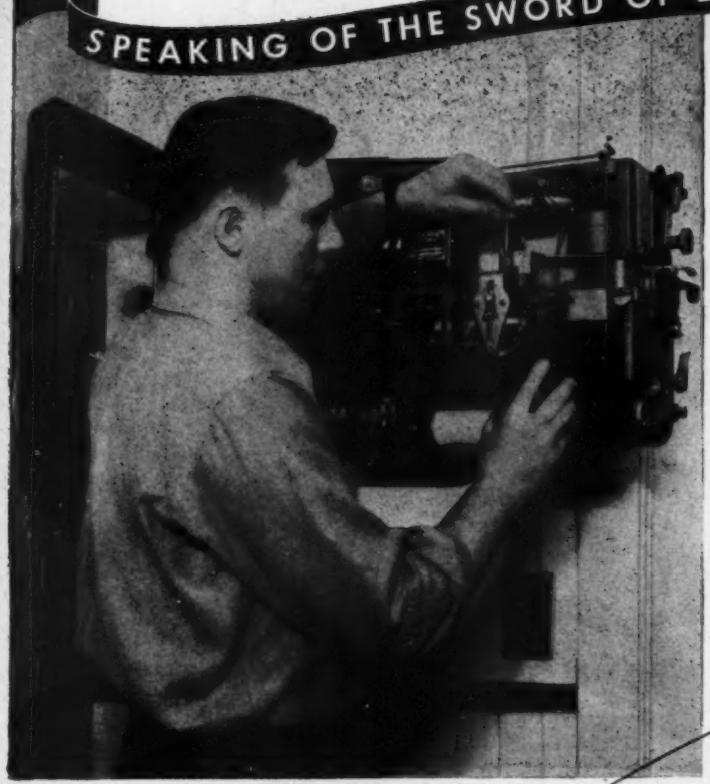

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a concentration of 38%, 18 to 20 parts of gum to 100 of clay.

A series of coating tests were made. Various starches were employed as adhesives. The results are given in Table 2.

The viscosity of the coatings was determined in a MacMichael viscometer at 25 C., using a No. 26 torsion wire. The MacMichael degrees were noted for various rotating speeds of the cup. These results were plotted one against the other, and the curve was extrapolated to zero r.p.m. The degrees at 56 r.p.m. was taken as the viscosity and the degrees estimated at zero r.p.m. as the plasticity.

Coatings having viscosities between 25 and 35 will brush satisfactorily on common equipment providing the plasticity is below 10. For the best results this value should be below 5. A coating having a plasticity of 10 or higher may show brush marks.

The Dennison wax tests were run on paper which was coated with a laboratory applicator, dried, and conditioned in a constant temperature—constant humidity room. These tests were run in quadruplicate. The whole number reported indicates no pick by the use of the wax of that number; fractions indicate the ratio of tests which show a slight pick on the next higher number wax.

The gum is prepared for machine coatings is 60 to 80% soluble in cold water. When cooked to a sol by heating 20 grams of the gum in 100 grams of water to 95 C. and then cooled at 25 C., the viscosity is approximately 50 centipoises.

Two hundred ten pounds of the machine coating gum is mixed with 73 gallons of water and the mixture is heated to 205 Fahr., and held at this temperature for 5 minutes. The adhesive is cooled to 120 or 130 Fahr. and then added to 500 pounds of clay (or other pigment) in a dough mixer. While this mixing is in progress, 3 pounds of hexasodium metaphosphate and 2 pounds of soda ash, previously dissolved in a small amount of water, are mixed in, and 500 pounds more of clay is gradually added. After a mixing period of about 1 hour (during which other adjuncts and dyes may be added) the paste is run to an ink mill. A three-roll mill can be used, although a five-roll mill is preferable. After grinding, the coating is screened and passed to a storage tank which is provided with slow agitation. For whitening the coating, the addition of 1 to 4 ounces of Violet N is recommended. The coating described contains approximately 65% added solids (commercial basis) or 60% actual dry solids.

The viscosity characteristics of these heavy coatings were measured in a Brookfield viscometer using an appropriate spindle and four rotating speeds. The results are shown in Table 3.

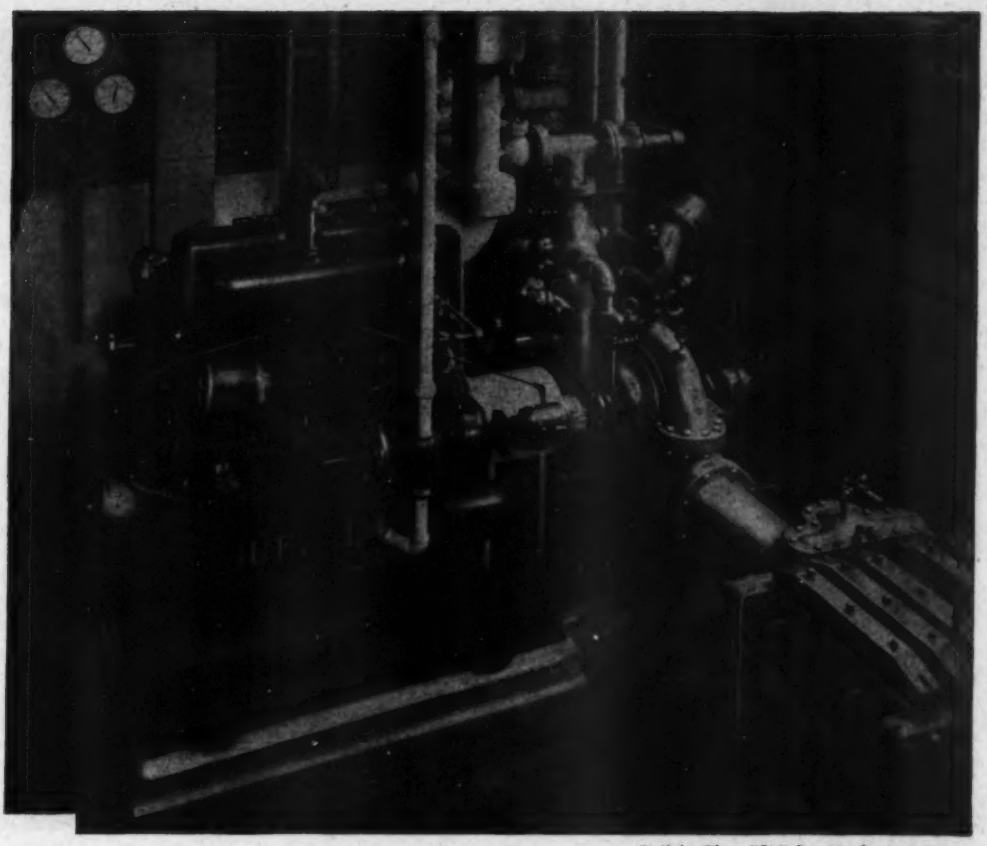
A high density coating for most types of machine application should have a certain degree of thixotrophy so that the relatively heavy bodied coating may be transferred as a thin film (on the rollers) to the paper sheet and so that in the transference, the coating will level itself and smooth out when pressure is applied at the nip of the roller. When a doctor blade is used to spread the coating, it is essential that a given applied stress should cause the coating to flow and to level out into a smooth surface. Thixotrophy may be defined as the reduction in viscosity for a given increase in the applied shearing stress. When the Brookfield viscometer is used to measure viscosity, a thixotropic index may be taken as the viscosity

Table 2—Characteristics of Low Density Clay Coatings Using 15 Parts of Starch Product to 100 Parts of Clay

Starch Product	% Total Solids	MacMichael Viscosity	Plasticity, MacMichael	Dennison Wax Test
Chlorinated	45	30.5	7.6	3¾
Peroxidized	45	28.2	1.0	4½
Enzyme converted.	45	32	3.0	4½
Brush coated gum	45	28.5	2.5	4½

Table 3—Characteristics of High Density Clay Coatings

Viscometer Spindle Speed r.p.m.	Viscosity of Coatings in Centipoises, Containing Chlorinated Starch	Special Gum	Thixotropic Index Coatings Containing Chlorinated Starch	Special Gum
2	408,000	48,400	5.6	4.2
4	232,000	30,600		
10	113,600	16,960		
20	72,000	11,520		



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at 2 r.p.m. divided by the viscosity at 20 r.p.m. and this value should be between 4 and 6 for most applications of coating which contain 60% dry solids. Both coatings studied are suitable in this respect.

However, it will be noted that at a concentration of 60% solids, the coating which contains the chlorinated starch has a viscosity more than six times that of the coating which contains the machine coating gum. The former coating is too thick to be usable, and it was diluted with water until its viscosity was comparable to the viscosity of the coating made with the special gum. The diluted chlorinated starch coating contained 49% of dry solids. Both coatings were applied to paper by machine application. The chlorinated starch-clay coated paper gave a Dennison wax test of 10, the gum-clay coated paper a wax test of 11. The gloss of each was quantitatively measured by reflection and found to be comparable and satisfactory.

Coated paper having a wax test of 4 to 5 is suitable for many purposes. For the degree of adhesion indicated by this wax test, the ratio of the machine coating gum may be reduced to between 12 and 15 parts per 100 parts of clay, and the total solids in the coating may then be increased to between 65 and 70%.

High density coatings with lower starch to clay ratios have the advantages of efficient use of adhesive, low drying time, high machine speed, ease of calendering, good gloss, and smoothness.

Linter Cotton Makes Fine Paper

WILLIAM H. JONES, Vice President
Railway Supply & Mfg. Company

With the development of Rayco linter cotton (first cut) as a raw material for the paper manufacturer—and particularly for the manufacturer of writing paper—a very important part of the paper industry has gained a new source of raw material.

Every bale of linter cotton, of the same grade, is uniform in quality for shipment-after-shipment and reaches the user free from contaminating material. And, most important of all, chemists and technicians are always ready to help each user in working out the particular problems raised by the adaptation of linters to his manufacturing process. It is to be recognized that each papermaker's production presents individual problems: such problems as how linters lend themselves to hydration in the beater process to yield a pulp of proper consistency, viscosity control, bleaching, sizing, how best to regulate length of cooking time, concentration of caustic used, and the amount of pressure used in the cooker.

Papermakers have been quick to find that one of the distinguishing features of linter cotton is its absolute uniformity. After grading and combining of grades there is uniformity in the bale itself. With linters there are no colors to eliminate, no dyes to wash out; the problem of such contaminating foreign matter as adhesives, cellophane and synthetics they are impossible to remove even by cooking and bleaching, thus giving untold trouble to the papermaker is absent.

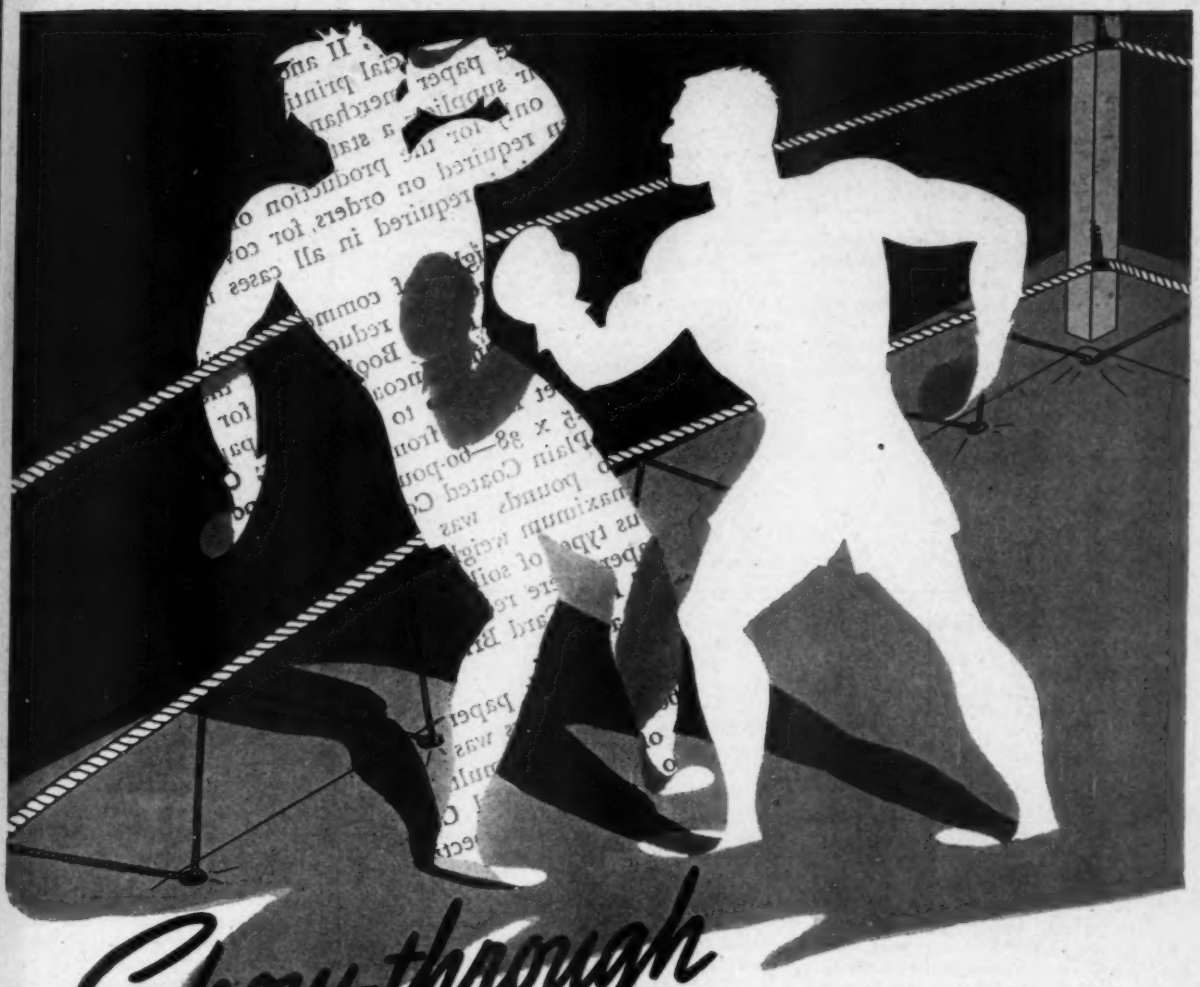
The fiber does not require sorting thus bringing a big saving in labor cost and it can be charged in large quantities in the cooker instead of having to be broken up into fine pieces.

In making tests, cooking time for linters have been reduced to 4 hours. In some cases, depending upon the grade of stock desired, it may be possible to get this cooking time down to 2 hours. There are no knots or weaving to beat out of linters.

Realizing that lack of sufficient cooker capacity was causing difficulty in keeping the papermaking machines in many plants operating to capacity, linter cotton was developed in wet lap form as an emergency measure. This pulp is shipped to the paper manufacturer ready for his beaters. It requires no sorting, cleaning, bleaching, or cooking. The wet lap pulp effects valuable savings of time and labor by eliminating many previously essential manufacturing steps in the paper mills.

Shown below are some of the actual physical and chemical characteristics determined for this pulp from tests obtained from composite sample taken from many cooks representing over 150 tons:

Alpha-cellulose (%)	98.3
Viscosity (cp.)	325
Copper number (%)	0.2
Ash (%)	0.2
Brightness	80.6



Show-through IS ON THE ROPES

Opacity, in the form of TITANOX, has really given show-through a thorough going over.

Paper manufacturers in increasing numbers have found in TITANOX pigments the answer to really adequate opacity in the lightweight stocks necessitated by present day restrictions. They have found that in addition to opacity TITANOX pigments give fine printing surface, extreme whiteness and brightness and that the strength of papers pigmented with TITANOX is in no way impaired.

It is safe to say that the important contribution of TITANOX in the solution of wartime paper making problems will result in much wider use of these fine pigments after the war.

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All chemical values are reported on a moisture-free basis.

Viscosity value is TAPPI cuprammonium viscosity obtained from a correlation curve between TAPPI and cupriethylenediamine.

Alpha-cellulose as determined by TAPPI Standard Method T 203 m-40.

Copper number was determined by TAPPI Standard Method T 215 m-42.

Brightness was obtained on a Photovolt Meter and translated into General Electric brightness units by use of a correlation curve made between the two instruments.

The freeness of this pulp runs about 880 to 890 using a Schopper Riegler freeness tester under standard conditions (2 grams moisture-free stock diluted to 1 liter at a temperature of 25C.) The pulp as it leaves the bleach plant is somewhat freer than this.

A strict control system plays a big part in the proper manufacture of good pulp from linter cotton. It has been found in manufacturing this pulp that the viscosity tests must be rapid and frequent. For this purpose, the cupriethylenediamine test is used, and a set-up is maintained by which the laboratory can report the viscosity of the pulp 20 minutes after they receive the wet sample as compared to the old cuprammonium test which required overnight agitation to put the sample into solution. With this improved method, the viscosity of the pulp is followed during the processing.

The minimum specification for viscosity established for linters pulp is 200 cp. in TAPPI units. The minimum of 200 cp. was selected because it has been found that, in general, values above this for the pulp give very little if any added strength to the paper made from that pulp. Of course, if the viscosity drops below 200 cp., the drop in sheet strength, in particular, fold, is immediately obvious.

As for the postwar future of linters in writing paper manufacture, it is expected that linter cotton will take its permanent place among the papermaker's standard sources of raw material.

Fiber Cans and Containers for Postwar

D. G. MAGILL, Manager, Fibre Can Div., American Can Company

The oldest form of fiber can manufacture was and is performed on what is known as the "spiral winder," a machine which takes two or more plies of paperboard with suitable adhesive applied to them, winding them spirally into a cylindrical tube which is subsequently cut off into can length and either paper caps or metal ends are then applied, the fiber bodies being labelled with a printed label applied either by the can manufacturer or by the packer. The latter usually employ what is known as a "spot labeller."

Another general type of fiber can is manufactured on a convolute winder which takes a single sheet of paperboard, usually of a lighter caliper than the spiral winder, applies a suitable adhesive to it and winds it on a revolving mandrel in such a manner that the single ply of paperboard is wound convolutely upon itself, the number of plies being governed as in the spirial type by the strength requirements of the product which is to be packed in it. The convolute winder may be of single or multi-mandrel type but is usually equipped with label magazines which permit automatic application of the printed label, utilizing the adhesive employed for winding as the means of holding the label to the outside of the container. This produces a fiber body of very neat appearance as the label becomes a part of the body itself.

As in the case of the spirally wound tube, paper caps or metal ends are applied to complete the container.

The convolute winder is able to produce oblong, square, and other irregularly shaped tubes. The spiral winder is confined to the cylindrical type as the mandrel is stationary. A third type of structure much less commonly used is the lap seam type which consists of a single ply of paperboard formed into the body, the adhesive being placed at the side lap only. This type can be made into irregularly shaped or round bodies and is completed in the usual way by applying either metal or fiber ends as in the case of the other types just described.

In all three types of fiber cans, special functional liners, treated papers, etc., may be added during the formation of the bodies in order to produce moisture-proof, liquid-tight, or greaseproof containers.

The fiber can industry also includes manufacturers of mailing cases, textile cores, cones, etc., but as the fundamental methods of manufacturing these products are similar to those above described except for certain specialties, the machinery and methods described cover those used by the manufacturers of such products.

Although many types of papers and boards enter into the make-up of the average fiber can, by far the most widely used in its various forms is the friend of the cartoon, folding, and set-up box makers, that ubiquitous board known as "chip."

With a kraft lining, chipboard is also used in enormous quantities in the manufacture of both corrugated and solid fiber shipping containers as well as in the make-up of fiber drums, etc.

The particular form of chipboard most used in the fiber can industry is known as "tube stock" and has a higher content of kraft pulp or kraft papers than ordinary chip and is well suited in rigidity and toughness for providing fiber can bodies with the carrying qualities they must have to deliver such commodities as salt, spice, baking powder, cocoa, and many other food products as well as drugs, chemicals, scouring powder, and scores of dry products of a similar nature.

Another form of board has been highly developed and used in considerable quantities in the past several years. It is known as "cover stock" and is used for bottom and top slip covers for many types of round cans. This board in former years appeared on the market as a sheet usually 0.025 to 0.030 in caliper and had a cooked straw back with a kraft or sulphite liner. Much of this stock now is largely made from waste papers containing a high percentage of kraft. It is lower in cost and generally is more satisfactory in strength and its performance in high speed cap drawing dies. This board is illustrated best as the type used on round cereal cans, salt cans, and the like, the liner of which can be colored to suit the needs of the packer. It also may be combined with asphalt to newsprint, etc., to impart some moisture resistance to the can.

In addition to the various types of waste paperboards used, there are the hydrated sheets such as glassine and grease-

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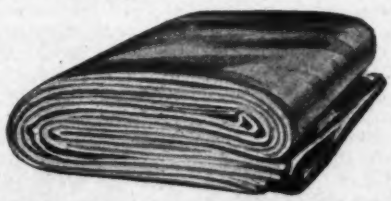

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proof papers ranging from 25 to 40 pounds in basis weight and which are used for functional liners in cans designed for products requiring grease and moisture resistant containers, or for other special types of products.

There is an appreciable tonnage of label paper stocks used in the fiber can industry in the form of liners as well as labels themselves. These labels usually go to the fiber can manufacturer in the single or gang form and are applied by automatic or semi-automatic means during the manufacture of the fiber can itself, although in many instances, customers provided with automatic labelling means, apply them in their own plants after the cans are filled.

To illustrate the large increase that the fiber can and tube industry has experienced within the last several years, figures are quoted from statistics provided by the National Fibre Can and Tube Association:

In 1939 the selling value of all products manufactured by member companies engaged in the manufacture of fiber cans, tubes, cores, and the like, amounted to approximately $18,000,000. The paperboard consumed to provide these products was estimated at 410 million pounds.

In 1942 the selling value had increased to approximately $35,000,000, and the paperboard consumption of all kinds needed to produce this selling value was estimated at 485 million pounds.

It has been estimated that in 1944 the selling value of fiber cans and allied products will have reached the total of $55,000,000 and a consumption of paperboard amounting to 680 million pounds.

The money value and paper consumption of the fiber can and tube industry during these years is actually much greater as the statistics available do not cover all the fiber cans and containers manufactured by many large concerns for their own use, such as the cereal companies and the packing companies, both of which manufacture cereal and scouring powder cans which in money value and paper consumption would amount to at least 40 per cent of the totals mentioned above.

It is believed that it is fair to assume that much of the increase as shown in 1942 over 1939 will be maintained and that papers and paperboards involved in the manufacture of fiber cans and allied products will be on a greater scale than in the years just prior to Pearl Harbor.

The functional properties of paper and paperboard have been developed considerably during the war period and there is every reason to believe that these developments will lend a wider use of the fiber can. This is believed to be particularly true in the type of composite can having metal ends and fiber bodies and which lend themselves to the development of a greater degree of protection than has been the case with certain types of all fiber containers.

These special papers and combinations of paper usually require at least one well hydrated sheet such as glassine or greaseproof these being best suited as carrier sheets for moistureproof lacquers, coatings, as well as wax combinations.

Combinations with regenerated cellulose such as cellophane will probably be used in greater quantities than heretofore and as metal foils become less costly they also will be combined with papers for use in the structure of special types of fiber cans.

All of this adds up to the fact that as the fiber can enlarges its field because of functional improvements, greater quantities of light weight papers will be used.

During the past five years, in co-operation with the paper mills, manufacturers of fiber cans have introduced tests and specifications designed to control the quality of these raw materials more thoroughly than heretofore.

Of much interest in the evaluation of boards in the postwar picture is the increased number of grades and calipers made on the fourdrinier machine. Although the physical characteristics of fourdrinier boards show some disadvantages as compared to cylinder types in fiber can and tube manufacture, a number of paper mills have succeeded in making fourdrinier board especially in calipers ranging from 0.008 to 0.014 which make excellent body stocks and a greater use of them in the future of our particular industry is predicted.

There is another factor in the postwar development of the fiber can which is involved in machinery built especially for war products containers.

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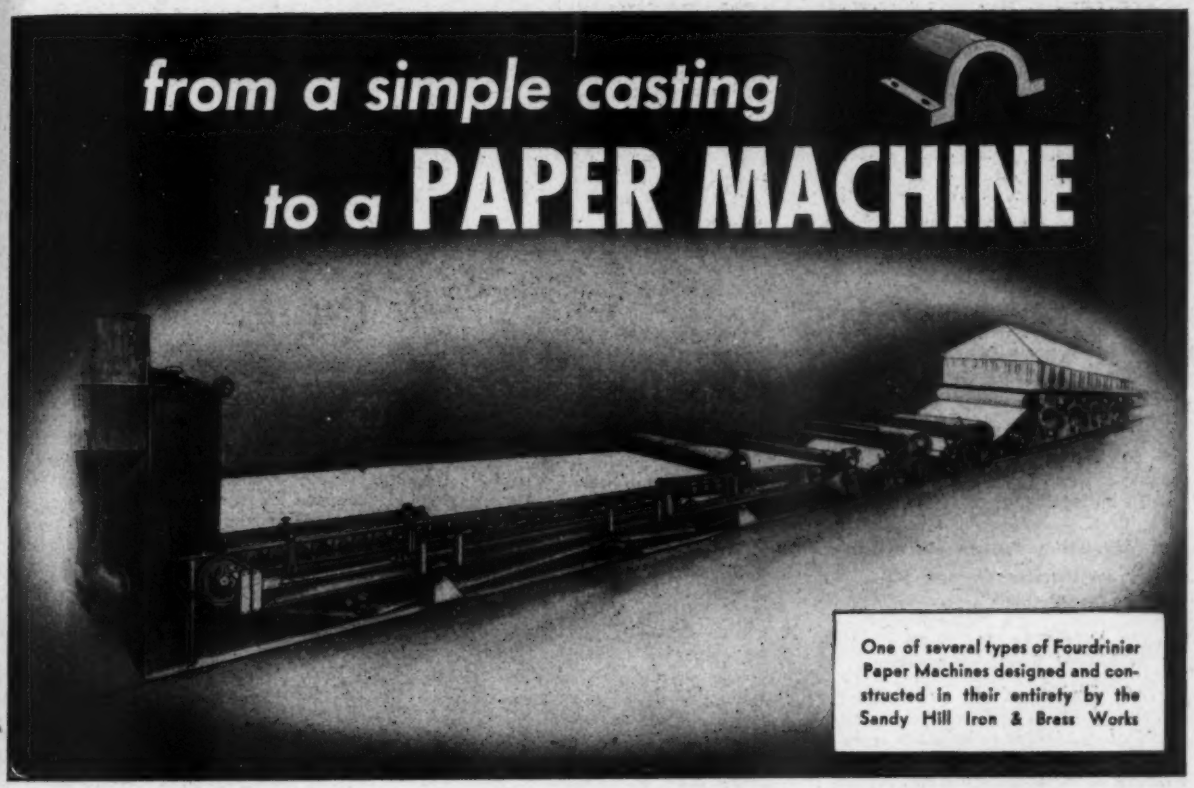
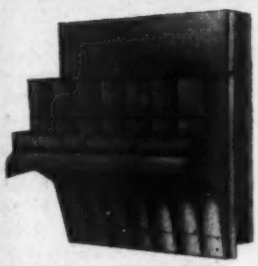


One of several types of Fourdrinier Paper Machines designed and constructed in their entirety by the Sandy Hill Iron & Brass Works



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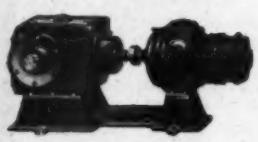

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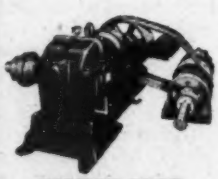

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this equipment or allow it to be operated for peace time uses, as there has been some talk of doing in Washington, there might be for a time at least a rise in fiber can volume and a consequent increase in the tonnage of paperboard and specialty papers consumed.

The postwar possibilities of fiber can papers depends greatly also on the price at which they are to be sold. If the price remains on a high level and steel declines, then the margin between metal and fiber cans may become so narrow as to reduce the volume of such fiber cans sold. This disparity in prices, however, is not anticipated.

It is the author's belief that the spread between the price of metal and fiber containers postwar-wise will continue as before and that with the new functions developed, or to be developed, for fiber cans, the industry can look forward to maintaining at least 30 per cent of the volume gained during the war.

Comparative Rough Handling Tests on Various Types of Case Liners

EARL R. STIVERS, Director
Package Research Laboratory

Thee purpose of the tests described in this paper was to compare various types of case liners in standard types of boxes under conditions simulating those existing in the arctic and tropic regions.

Thirty-one different types of case liners were compared involving the testing of almost 2,000 boxes. These boxes were in two sizes, a large box 28¼ inches long by 18⅞ inches wides by 15⅜ inches deep and a small box 18½ inches long by 12⅜ inches wide by 9 5/16 inches deep. Nailed, wirebound, and playwood boxes were used for the large size; nailed, wirebound, and fiberboard V2s boxes were used for the small size. All boxes were made as good as or better than U. S. Army Specifications No. 100-14A.

The original instructions specified that the contents should be metal parts of irregular shape individually wrapped in paper and weighing approximately 1 pound each for the small box and approximately one-third less in weight for the large box. After fruitless attempts to obtain such parts from several sources, it was decided to use 3 inches long by 3 inches round hollow steel cylinders and 3 inch wooden cubes individually wrapped with corroflex and kraft paper respectively. Not only were such parts more readily obtainable, but they also assured the loading of every box in exactly the same manner. In the first series of tests, the large box was packed with a loose wrapped load of 193 pounds or 40 pounds per cubic foot.

A round pad was placed in each corner and the outside cylinders placed parallel to the scores of the case liners. Preliminary tests developed the fact that this arrangement was so severe that a change liners were to come through the tests at all. The damage done even with this arrangements was so severe that a change was made later to a cartonized load.

All small boxes were tested with a loose wrapped load of steel cylinders. Here again corner pads were used and the cylinders next to the scores were laid parallel to them. This load weighed 66 pounds or 55 pounds per cubic foot.

In following tests, the load for each large box was cartonized. Steel cylinders and wooden blocks were placed inside 200 pound test "B" flute cartons and six cartons with a gross weight of 175 pounds were packed in each box. Before packing, each corner on each carton was flattened with a mallet.

Each box was examined carefully for poorly clinched nails or staples and these defects when found were corrected. Each liner was examined minutely for holes, scuffs, tears, and poorly pasted joints and when any such defects existed that liner was rejected.

The liner to be used was placed over a mandrel, formed to shape, and then placed in the test box. Each case liner packed with the cartonized load was also protected by 200 pound test pads on each side, end, top and bottom. These pads were cut 1 inch scant in length and width and had their corners clipped off ½ inch.

After the box was packed, the case liners were sealed. Some liners were furnished with an asphalt adhesive protected by a cellophane strip. These liners were sealed by bringing the top edges of the liner together and applying pressure by means of a pair of rollers. A few of the liners which were coated with a thermoplastic material were heat sealed.

The boxes were closed, nailed, and strapped as well as or better than required by U. S. Army Specification 100-14A.

All boxes regardless of size or test conditions were first given 30 falls in the standard rough handling machine.

After the drum test, the boxes were routed to either the arctic or tropical room.

For the arctic test, the boxes were first given a one hour wetting in the spray room and then placed in the arctic room while still wet. This room has a floor area of 8 by 6½ feet and usually was loaded with ten large and ten small boxes. On a few occasions, however, the boxes were doubled decked ad as many as 30 large or 45 small boxes placed in the room.

Two automatic controls permitted exact duplication of conditions for each test lot. One control held the air in the room at the preselected minimum, the other held the inside of the box at the desired minimum temperature.

In these the air control was set for a minimum of minus 30 Fahr. and the box control for minus 10 Fahr. About 12 to 14 hours was required to lower the temperature inside the box to the desired minimum. The boxes were held at a tempehature of minus 10 Fahr. inside the box for at least two hours before being removed for further tests. These additional rough handling tests were made immediately on each box as it was removed so that no box was out of the room more than five minutes before the tests were complete. Readings taken on typical boxes indicated the temperature inside the box changed so slowly that there was no apparent change in this short period.

The large boxes were given six complete end over and cycles after being taken from the arctic room. The small boxes were dropped on each of their eight corners from a 12 inch height.

For the tropical test the boxes were taken directly from the drum and placed in the tropical room for a period of 24 hours. This room has a floor of 12 by 7½ feet ad was loaded with fifteen large or ten large and ten small boxes on dollies. Twenty minutes out of every hour spray heads in the ceiling delivered 2/3 of an inch of water at 70 Fahr. over the entire area.

A two pen control instrument working with dry and wet bulb thermometers kept the temperature at 100° Fahr. and the humidity at 90 per cent. In the early hours of the period, the water spray caused a drop of 10 degrees in the temperature but toward the end of the period the drop was hardly perceptible.

After 24 hours in the tropical room, the boxes were placed on the vibrating table for two hours. This vibrating table operates at 500 r.p.m. with ¼ inch travel. The arrangement of the boxes was the same for all groups of case liners—two large boxes on bottom, two on end ad one on side; or six small boxes on bottom, two on end, and two on side.

After the complete cycle of tests, either arctic or tropical, the boxes were placed in the spray room for one hour. In this time, they received a thorough wetting to develop any failures in the liners.

The boxes were opened immediately after spraying and the load scored for dryness. The case liners were removed from

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the boxes and carefully examined for holes, tears, scuffs or other damage.

Most boxes were still in fairly good condition after the tests. Warping was the most serious damage and this occurred to any extent only in the tropical test.

All types of boxes may have occasional defects which may injure the case liner. In pointing out these hazards, it is not intended to condemn any one type of box. All are used successfully and all are necessary to the war effort. Loose or broken knots, adjacent boards of unequal thicknesses, and often warped boards cause sharp edges that cut or scuff case liners. Nail pulling causes an increase in box dimensions while nails which are roughly clinched, deflected by knots, or driven in the wrong places frequently result in punctured liners. Roughly sawn boards and warped boards cause a concentration of load on small arear increasing abrasion on the liner. Unclinched staples and loosened metal fasteners on the inside of the box are difficult for any liner to overcome. Lack of rigidity in the paper box throws strains on the scores of the case liners causing large tears if the liner is not flexible.

Failures noted in the case liners were holes; tears, scuffs, pinches, and wicking. Holes were listed as pin holes up to 1/16 inch, small holes, 1/16 to ⅛ inch, and large holes, over ⅛ inch. With the loose wrapped load holes of all sizes occurred in approximately equal numbers. With the cartonized load, holes were predominately pin holes.

Tears occurred mostly at the scores and ranged from ½ to 9 inches long. These were usually due to liners that were unable to stretch and accommodate themselves to distortion such as occurs when there is nail pulling or when the box has no rigidity at all as with the fiberboard box.

Scuffs were due mostly to abrasion of wet liners by rough or warped boards. Some scuffing was severe enough to wear holes completely through the case liner.

A pinch occurred when the liner worked in between poorly fitting box parts or when the load filled the box so completely as to make it difficult to close.

Wicking or wetting through the liner without puncture occurred when the liners did not have a complete barrier between inner and outer layers or when scuffing removed the outer layer.

The Modern Artificial Pulpstone

J. H. PERRY
Pulpstone Technical Advisor
Norton Company

Until 1920 all mechanical pulp was produced on natural stones. At that time, the Norton Company decided to investigate the possibilities of producing pulp with artifical abrasives and many sand stones were analyzed to arrive at the proper grain size, grain distribution, and hardness.

By 1926 a pulpstone had been developed to meet all the mechanical strains encountered in the pulp mill at that time and which would produce a good quality pulp. Since then, great strides have been made in mechanical pulp production; new grinders have been designed utilizing power inputs as high as 2800 hp. per stone simply because it was possible to build a stone strong enough to absorb the high power and high surface speed.

Within the next few years there may be grinders operating with 3000 hp. per stone at speeds up to 5000 s.f.p.m. Each step in the progress of pulp mills has been met and often anticipated by the artificial pulpstone manufacturer.

There are three types of abrasive used in the pulpstones, trademarked Crystolon, Alundum, and 38 Alundum.

In the finished pulpstone, the grains of abrasive are held together and spaced with a vitrified bond. The bond is made by melting clay, feldspar, and other material into a porcelain or glasslike substance.

Among the terms used in pulpstone specifications are: grain, grade, and structure. By grain is meant the type of abrasive and the size or sizes to be employed. By grade is meant the hardness or tenacity by which the abrasive grains are held together. Structure means the relative grain spacing. The grain sizes employed in pulpstones range from a coarse No. 16 grit to 100 grit size and many combinations of the different sizes. The grade at the present time ranges from "J" soft to "S" hard. The structure range in pulpstone is from No. 5 structure which is dense to No. 12 structure which is very open.

There is yet another feature, designated as "controlled structure," by which the grains of abrasive are definitely spaced in the segment structure so that the same uniform grinding face is presented from the first day the stone is used until it is worn out and discarded.

Each segment is tested for grade and carefully examined for imperfections. Any segment showing the slightest imperfection is discarded.

The segments are assembled with a jointing material placed between them to permit free expansion and contraction with changes in temperature.

When a pulpstone reaches the mill, it is good practice to leave it on its skids until the time comes to hang it. This helps to protect the stone from damage while on the grinder room or stores department floor. It is essential that the shaft and flanges are in good shape and strong enough to stand the load used on the grinder. Insulating board, made of groundwood, about ⅜ inch thick, is the most popular flange gasket material used today, but some mills use drier felt, wood, or cement grout. The use of bronze sleeves to protect the threads on the shaft and flanges is widespread and is recommended.

Because of centering screws in the bore, it is possible to hang the stone to almost perfect concentricity. It is, therefore, not necessary to true it before installing in the grinder. After installation it should be dressed by opening up the surface with a relatively fine diamond burr before the pulpmaking burr is applied.

Start-up temperature on a newly installed stone is most important. This is especially true in the winter time should the stone be very cold. Normally the stone is about the same temperature as the grinder room when started, about 70 Fahr., and should not be increased more than 10 Fahr. per hour until the stone is up to normal operating temperatures. Operating temperatures vary widely depending on mill preference together with the temperature of white water system.

Normal operating temperatures today range from 140 to over 180 Fahr., but in some mills where fresh water showers

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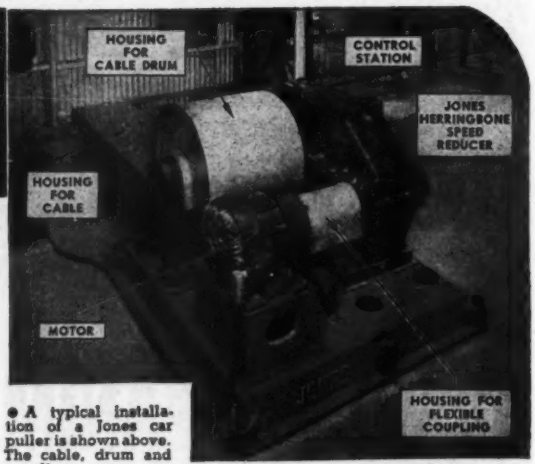

● A typical installation of a Jones car puller is shown above. The cable, drum and couplings are enclosed by sheet metal housings as an extra precaution in this installation to eliminate all hazard from moving parts.

● A complete Jones car puller unit. These outfits are for use with wire rope and are manufactured in a wide range of capacities to suit the number of cars to be handled in each plant.

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are used, the temperature during the winter may be as low as 110 Fahr. Other things being equal, better pulp is made at higher temperatures, and there is no danger to the stone at these temperatures if the variations are held to fairly close limits. Low consistency grinding has greatly increased the accuracy of temperature control and has made the temperature regulators, when properly installed, an efficient control instrument.

During shutdowns, it is preferable that the stone cool off as little as possible. Some mills accomplish this by raising the dams and leaving the stock in the pit. Others have the front of the grinders covered up so that cold drafts cannot strike the stone, whereas others during a shutdown keep the temperature of the grinder room about 80 Fahr. so that the stone does not have a chance to become chilled.

Unfortunately, the majority of mills have to use unheated fresh water on start-ups and during the winter months, this is often only a few degrees above the freezing point.

In the event of damage to a pulpstone by overheating or some other external means, the pulpstone is so designed that a new segment can be installed in the grinder, eliminating the necessity of dismantling and losing many hours of valuable operating time.

A pulpstone over half worn out can be repaired with a patch of special pulpstone cement; some mills insert pieces of a broken up segment in the patch giving it an abrasive content which will take a burr impression. A patch applied in this manner will last the remaining life of the stone.

There is no set formula used in selecting specifications for a pulpstone. However, the following factors have to be considered:

(1) Wood to be ground; (2) type of pulp required; (3) type of grinder; (4) power input; (5) area of contact; (6) peripheral speed; (7) cylinder pressure (unit pressure); (8) condition of grinder; (9) condition of lathe; (10) sharpening technique; and (11) general operating and control practices.

Thickening and Washing Equipment for Pulp Bleaching

WARD H. PITKIN
Oliver United Filters, Inc.

Oliver vacuum filters were first used as bleach washers about 22 years ago by a Wisconsin mill for washing deinked book stock after bleaching.

As the use of the vacuum washer spread to the freer pulps, such as, sulphite and kraft, it was necessary to provide much greater hydraulic capacity, particularly on the larger units. This led to the development of the Ringvalve design.

The passages leading from the sections on the surface of the drum to the automatic valve at the end of the trunnion were eliminated. The automatic valve was then located in a central position and annular to the internal diameter of the drum. This type of valve is called the Ringvalve. It has two large outlet ports for each section. These ports are located at the leading and trailing edges of each section; thus, rapid drainage is assured either in an ascending or descending position. The effluent flows from the sections through the valve directly into the interior of the drum. It then flows out through the hollow trunnion to a single barometric leg.

The hydraulic capacity of a single unit is 700 gpm with a 21.5 inch outlet trunnion, and 10,000 gpm or more, with a 28.5 inch outlet trunnion. These capacities are calculated at a flow rate of less than 6 feet per second through the valve.

The elimination of the internal passages or piping greatly reduced the resistance to the flow of the effluent. Low resistance to flow means better vacuum at the sheet where the actual work of washing and thickening is accomplished.

All 8-foot diameter drums are of the filter type under discussion with 24 sections for bleach washing and thickening; this design has been proven in the mills for a period of five years.

Stainless steel sleeves are used on the trunnions where they pass through the stuffing boxes in the vat to eliminate the possibility of wear on the rubber.

A standard heavy duty pulp type worm drive is used on all washers, thickeners and deckers. This drive will transmit 20 hp. It is equipped with an alloy bronze gear and anticipation thrust and worm shaft bearings. It is mounted in a rugged cast iron housing.

Various prime movers are available, but

HOW TO AVOID LOSSES AT THESE 7 DANGER SPOTS IN YOUR MILL

IN LOG STORAGE

Stains originating in rot and fungi in pulp logs can be prevented by application of a one to two per cent water solution of Santobrite. Logs, peeled or with bark on, can be dipped in the solution or sprayed with it in the woods or upon unloading at the mill.

IN SLIME IN MILL SYSTEM

Microbiological activity causing slime spots and breaks, blinded wires and plugged felts, obstructed stock and water lines, and stock losses can be effectively combatted by using 0.1 to 1.0 pound of Santobrite per ton of product made.

IN STORED PULP LAP

Rotting, staining, specking and sliming of chemical or mechanical wood pulps in damp storage can usually be prevented by incorporation of 2 to 4 pounds of Santobrite per ton of dry fibre.

IN ROTTED FELTS

Santobrite is toxic to degrading micro-organisms responsible for rotted paper machine felts. It is recommended that felts be impregnated with a 0.5% to 1.0% solution (by spray) when shutting down.

IN SPOILAGE OF STOCK

Decomposition of board stocks, with disagreeable odor arising therefrom can be prevented usually by the addition of 0.5 to 1.0 pounds of Santobrite per ton of dry fibre.

IN SPOILAGE OF SIZE

Protein, glue and starch sizing and coating materials, subject to attack by molds and bacteria, can be satisfactorily preserved by the use of 0.5% to 2.0%.

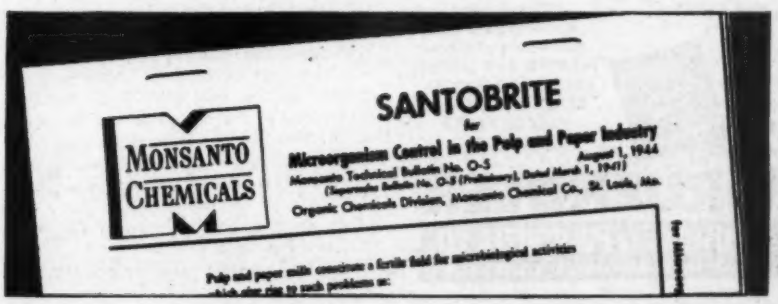
IN MILDEWING OF FINISHED PRODUCTS

Boxboard and board used for egg case fillers and flats, etc., may be protected against mildew by incorporating Santobrite in amounts varying from 0.05% to 1.0% of the weight of the fibre.

The use of Santobrite (sodium salt of pentachlorphenol) for control of paper mill micro-organisms has been proved in practical mill application for years. Few if any mills require all these applications, but few, on the other hand, could not profit by the use of a number of them.

Santobrite is chemically stable, non-corrosive to equipment, non-volatile, comparatively odorless, and properly handled, is easy and safe to use.

For complete information on Santobrite for your mill, write for Technical Bulletin O-5, "Santobrite for Micro-organism Control in the Pulp and Paper Industry"; MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.



direct connected d. c. motor drive is the most popular because it provides an excellent variable speed drive with exceptionally low maintenance.

Sheet discharge is by single, rubber covered fluted roll chain driven from the filter worm shaft.

All parts coming in contact with the pulp or liquor are either rubber covered or stainless steel to eliminate contamination and corrosion. Rubber covered construction with stainless fitted is used for the washers and also for washer thickeners if the consistency of discharge required is medium density. Press rolls are rubber with stainless wire jackets and pneumatic lifts.

Washer and thickener vats are of standard design so that drums are interchangeable. Design is such that they may be mounted through the floor thereby eliminating an operating platform. The standard drums may be mounted in reinforced tile vats if desired.

High Density Thickening

High density thickeners and washer thickeners are equipped with rubber or stainless covered press rolls operated by pneumatic cylinders for both pressure and lift. Self-aligning antifriction bearings are used.

The drums are specially designed in stainless construction to carry roll pressures of 100 pounds per linear inch.

The deck is formed with a special shaped stainless steel wire much stronger than the usual wire wound deck.

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Deckering

The rubber covered filter is also used for the deckering operation on bleached pulp following flat screens. The extremely high capacity is particularly needed for this part of the operation.

This design of filter is particularly suitable for washing and thickening because quick removal of the effluent from the sections is necessary for the formation of a uniform sheet.

The pulp to be washed is thoroughly mixed with diluting water in a head box to provide a feed consistency of approximately 1%. This mixture then flows into the vat through a full length inlet on the ascending side of the drum. It is necessary for much of the feed to travel over to the opposite side of the vat where the bare sections are being submerged, because the rate of flow through wire is greatest when the sheet first starts to form. This travel of the feed in the vat provides the agitation and circulation necessary for good sheet formation. The pulp is kept "live" at the ends of the vat by a natural flow around the ends of the drum. Ample clearance between the drum heads and the vat is an important feature of the design.

As the sheet is formed on the drum, the water containing the soluble impurities is removed by vacuum. When the consistency has reached about 10%, a wash is applied in the form of low pressure sprays to displace the remaining impurities. If the amount of wash water drawn through the sheet exceeds that contained in the sheet, there will be very good removal of impurities.

Best results are obtained with a well formed sheet about ½ inch thick, and the drum operating at relatively high speed. More wash water can be applied per pound of pulp than at slower seepds which necessitate heavier sheets.

Washing efficiency depends on the character of the pulp, the quantity of solubles to be removed, and other variables. It is usually about 98% if the solubles to be removed, expressed as chlorine, amount to as much as 5% of the weight of the pulp.

Heat Utilization in Rotary Kilns Burning Lime Sludge

RALPH GIBBS
Consulting Chemical Engineer

Ordinarily, lime sludge as fed to the kiln contains a substantial quantity of water. Up to a certain point, this water accompanying the solid material has very little effect on the over-all performance of the kiln. Beyond this point, however, the effects are serious in the demand for heat.

Assume the material is introduced at a temperature of 75 Fahr. After it is deposited in the kiln, the "load" or feed is exposed to the hot gases and hot walls of the kiln and its temperature is elevated and the water is evaporated. Sensible heat is utilized in raising the temperature to 212 Fahr. or thereabouts.

At about 212 Fahr., most of the water will be evaporated.

The equilibrium dissociation temperature of calcium carbonate at atmospheric pressure is about 1640 Fahr. Thus, the solid material must be raised to 1640 Fahr. for dissociation to commence.

The heat required to dissociate calcium carbonate is close to 740 B.t.u. per pound of calcium carbonate.

This dissociation process follows the general behavior of such chemical reactions which are accelerated at elevated temperatures. Consequently, in order to facilitate this conversion, temperatures in excess of 1640 Fahr. are necessary. Thus, the bulk of the processed material must be superheated.

In operating practice, the burned or calcined material generally is discharged at some temperature lower than the maximum attained in the kiln. This lowering of temperature is accounted for in the kiln shell heat loss and heating the fuel-air mixture.

If no heat is recovered from the lime after it leaves the kiln proper, then for a heat requirement the total heat in the lime at the point of discharge from the kiln must be accepted. With properly designed coolers, possibly 50% of the sensible heat in the lime discharged from the kiln can be recovered and returned to the process in the form of preheated air for combustion.

The hot gases and vapors leaving the kiln at the feed end carry with them quantities of heat depending upon the quantity of fuel fired and upon the quantity and water content of the material fed to the kiln.

The importance of securing a good transfer of heat between these gases and the material is easily understood since, by so doing, heat will be returned to the system instead of being wasted.

It has been explained that the nature of the main chemical change is such that the equilbrium temperature is about 1640 Fahr., and that higher temperatures are required to hasten this alteration. In practice, the optimum maximum temperature is between 2250 to 2700 Fahr. Thus, the combustion and evolved gases at temperatures below these values are of little use except for the purpose of preparing the material for calcination. In other words, drying and preheating.

The use of chains in the feed end of the kiln affords an excellent means of increasing the heat transfer rate from the gases to the material being processed so that it is common under these conditions to have the gases leaving the kiln at 450 to 600 Fahr. Thus heat in the gases equivalent to 600 to 1050 Fahr. can be utilized in the evaporation of water. As a consequence, 30 to 40% of water in the kiln feed has little over-all effect on the production rate or fuel requirement of the kiln compared to a dry process operation.

The heat requirement at 2600 Fahr. to calcine 1 pound of lime with no water in the feed amounts to 2250 B.t.u. or 4,500,000 B.t.u. per ton of lime. This heat requirement is equivalent to 4,500,000/143,000 (approximate heating value of 1 gallon of bunker C oil) = 31.5 gallons of oil per ton of lime. Ordinarily this fuel requirement will be about 50% of the total so that approximately 63 gal-

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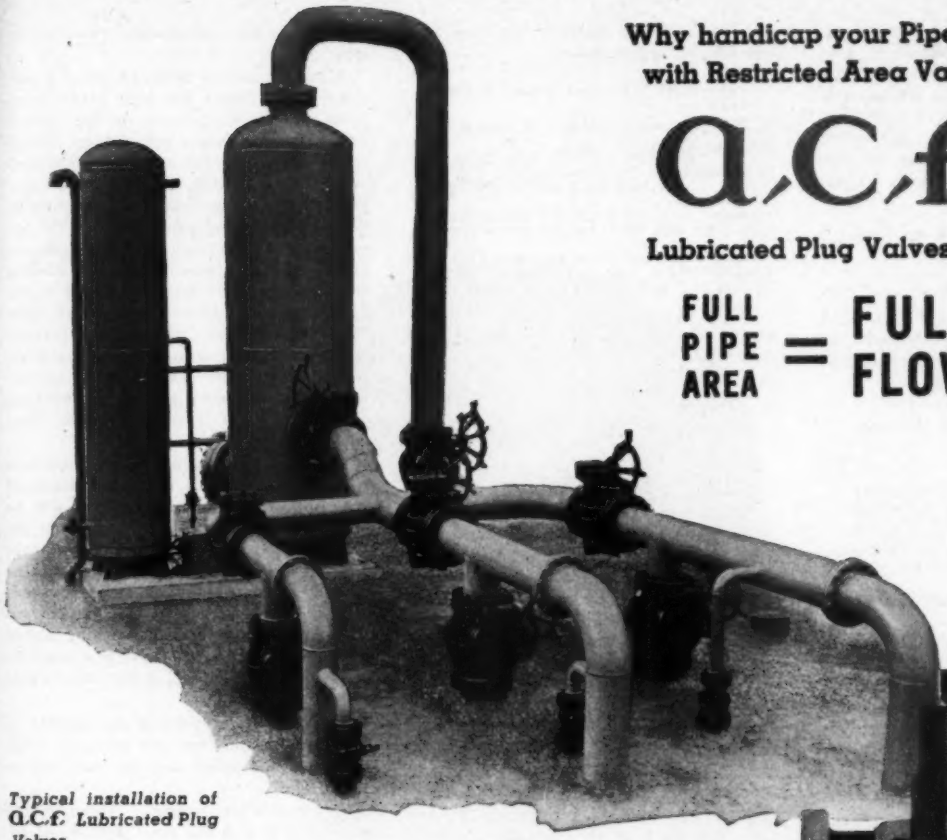

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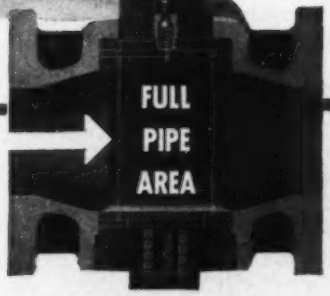

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lons of oil will be the total requirement.

In addition to the utilization of heat as described, there is heat requirement that cannot be passed by without due consideration. This heat requirement is the kiln shell or kiln surface heat loss. In a previous article (Gibbs, Ralph, *Chem. & Met. Eng.*, April, 1944), the following emperical equation is given:

$Q = 1150\pi DL$ = Over-all kiln shell loss, B.t.u. per hour. (1)

$\pi = 3.14$
D = Kiln shell diameter in feet.
L = Kiln shell length in feet.

In another article (Gibbs, Ralph, *Rock Products*, Nov., 1942) is presented an emperical relation for the production rates of rotary kilns are:

$T = \frac{k\,D^3L}{100}$ = Tons of lime per day, where (2)

D and L are as above.
k is a constant of value depending upon the material being processed and other factors entering into the general conduct of the process. k is, ordinarily, very close to 1.5 for the production of soft-burned lime from dry kiln feed.

Equation (2) can be changed to

$t = \frac{k\,D^3L}{2400}$ = Tons of lime per hour or (3)

$t' = \frac{2000\,k\,D^3L}{2400} = \frac{k\,D^3L}{1.2}$ = Pounds of lime per hour.

Dividing equation (1) by equation (3), the relation resulting is:

$S = \frac{4340}{k\,D}$ = Shell loss, Bl.tu. per pound of lime. (4)

PROBLEM

How is the heat utilized in processing to lime a slurry containing 40% water in a kiln 8 feet diameter by 150 feet long and burning 65 gallons of bunker C oil per ton of lime with the exit kiln gases at 600 Fahr. No lime coolers are used and the lime is discharged from the kiln at 2200 Fahr. at a rate of 135 tons per day. Combustion is balanced.

SOLUTION

3540 B.t.u. are required to evaporate water, heat and calcine to 2200 Fahr. 1 pound of lime from a slurry containing 40% of water.

Burning 65 gallons of oil per ton of lime to perform this operation results in:

500 pounds of combustion-formed water
2360 pounds of water from slurry
1650 pounds of combustion-formed carbon dioxide
1570 pounds of mineral carbon dioxide
5550 pounds of nitrogen.

With the kiln gases leaving at 600 Fahr., the heat leaving the system above 212 Fahr. with these gases is:

533,000 B.t.u per ton of lime with the water vapor.
312,000 B.t.u. per ton of lime with the cabon dioxide.
560,000 B.t.u. per ton of lime with the nitrogen.

Total 1,405,000 B.t.u. per ton of lime produced, or
703 B.t.u per pound of lime produced.

The kiln shell loss is found by solving for k, as

$$\frac{100T}{D^3L} = k = \frac{100\times135}{64\times150} = \frac{13{,}500}{9{,}600} = 1.41$$

and for the 8-foot diameter kiln shell this loss will be approximately

$$\frac{4340}{1.41\times8} = 385 \text{ B.t.u. per pound of lime.}$$

Thus the total utilization of heat is composed as follows:

In discharged lime .....3540 B.t.u. per pound lime,
In exit kiln gases ..... 703 B.t.u. per pound lime,
Kiln shell loss 385 B.t.u. per pound lime,

Total .....4628 B.t.u. per pound lime, or 9,256,000 B.t.u. per ton of lime, equivalent to 64.7 gallons of oil per ton of lime.

If the exit kiln gases were 1200 Fahr. instead of 600 Fahr. the fuel requirement would be:

In discharge lime .....3540 B.t.u. per pound lime,
In exit kiln gases .....2090 B.t.u. per pound lime,
Kiln shell loss 385 B.t.u. per pound lime,

Total .....6015 B.t.u. per pound lime, or 12,030,000 B.t.u. per ton of lime equivalent to 84 gallons per tone of lime.

Thus, it is seen that by controlling the temperature of the exit kiln gases to 600 Fahr., instead of 1200 Fahr., the saving in fuel is very near to 20 gallons of oil per ton of lime produced. At 5 cents per gallon delivered to the kiln, this saving will amount to $1.00 per ton of lime ore, at the assumed production rate, $135.00 per day.

The use of lime coolers would further better the fuel consumption. The equivalent heat in the lime when discharged at 2200 Fahr. is 3540 B.t.u. per pound. At 200 Fahr., it is approximately 3100 B.t.u. per pound. Thus by recovering 50% of this available heat, there would be (3540 — 3100) .50 = 220 B.t.u. per pound of lime returned to the system. This is equivalent to 440,000 B.t.u. per ton of lime or 3.1 gallons of oil per ton of lime. In terms of dollars, this represents a saving of $20.90 per day for which it is worth striving.

Further Developments Required of Machine Coating

H. N. CASE
Sears, Roebuck & Co.

As a pioneer in the application of machine coated printing paper to the needs of mail order production, Sears, Roebuck and Company has kept in close touch with the development since its inception.

Today, with heatset inks and 40 pound machine coated paper, a quality of printing is being obtained on high speed rotary presses that formerly was obtained on 55 pound brush coated when printed on sheet fed presses and delivered in sheets. This accomplishment has materially changed the economics of four-color printing and has permitted considerable expansion in the application and consumption of four-color units in the Sears, Roebuck catalogue.

It should be emphasized that during the war, it has been easier to maintain quality in the machine coated grades than in the conventional brush coated paper. Therefore, it can be stated that the production of machine coated paper for use with four-color half-tone printing on high speed rotary presses with folders is successful and that such paper has been absorbed into the economics of the graphic arts.

A project for the development of a machine coated paper for high grade four-color rotogravure printing on high speed rotary gravure presses with folders should be on the docket for collective work and development. After the war, the rotogravure process probably will continue to be increasingly popular. Many of the paper mills now making uncoated gravure grades also are planning to add coating equipment. Since machine coated paper as now constituted has not proved satisfactory to printers of large rotogravure jobs, it will be necessary for all manufacturers of machine coated papers to recognize this deficiency and to do something about meeting it if they desire to share in this large market.

Inasmuch as many of the machines now producing raw stock for supercalendered roto, according to present plans, will be changed over to machine coating after the war, where will the required rotogravure tonnage be obtained if not from machine coated paper. Really, it seems advisable that an engineering project be entered into by the producers of machine coated paper and TAPPI to develop a machine coated paper that will print rotogravure satisfactorily.

Roto presses at present are capable of operation at 1800 feet per minute. After the war, this speed may be increased to 2000 feet.

With such high operating speed of roto presses and with the new methods of cylinder etching and manufacturing of the printing cylinder, the need for study to produce better paper surfaces is evident.

The most important physical properties desired in such a paper are: improved rotogravure ink receptivity and a coating resilience greater than the starch machine coated paper now available.

The exact relationship of roto cylinder etching and paper characteristics is yet to be worked out. Apparently no paper will blot out all of the ink from an intaglio etch. Maybe such a paper is not desirable.

One thing is certain, however, and that is that no rotogravue printer likes machine coated or any other coated paper for big production jobs. In this attitude is revealed the principal need of the graphic arts. With proper co-operative effort, machine coated paper can be made to fill this need.

There also is a need for a machine coated paper with greater heat resistance. Such a paper would be particularly desirable in heatset printing, and to a lesser extent, in rotogravure.

In heatset printing, terrific heat is applied to paper on the press in order to set the inks. This heat may be so intense that the paper becomes too brittle for the folder and subsequent binding operations.

This problem concerns both the ink maker and the papermaker.

The attempt is being made by ink makers to develop inks that will require less heat for drying. It is questionable, however, if such inks can be made without sacrificing production or quality of printing.

It doesn't make sense, folks

A man's a fool to go around with his pants pocket burning with extra folding money when he ought to buy an extra Bond, because that loose lettuce is the stuff inflation is made of. When that extra dough goes hunting for civilian goods (that are as hard to find as Crosby in a tuxedo!), it tends to push up prices. Besides, it doesn't make sense when twelve million kids are fighting our battle for any of us to hike up the cost of living by buying anything we can live without.

Bob Hope

ONE PERSON CAN START IT!

You give inflation a boost . . .

—when you buy anything you can do without

—when you buy above ceiling or without giving up stamps (Black Market!)

—when you ask more money for your services or the goods you sell.

SAVE YOUR MONEY. Buy and hold all the War Bonds you can afford—to pay for the war and protect your own future. Keep up your insurance.

HELP US KEEP PRICES DOWN

A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America

It seems that what is needed is something to be added to the paper furnish or to the coating that will impart heat strength to the finished paper. The paper industry has had a comparable problem in the production of wet strength paper. This problem has been met and now wet strength paper is being produced by many mills. Therefore, it is beyond the realm of possibility to produce a paper with heat strength comparable in numerical terms to the wet strength now being produced. It is believed that the answer is "No."

Obviously publishers of both magazines and catalogues will prefer these new grades of coated paper in place of the former uncoated paper if the combined improvements in quality from an advertising or production standpoint equal or exceed the increased cost. Each improved grade must compare favorably when printed with any former quality, price considered, and the final judges will not always be printing or paper technicians.

Sizing of V Board Component Stock with Asphalt Water Emulsions

R. H. CUBBERLEY
Flintkote Research Laboratory

The demands of the armed forces for extreme durability of fibrous shipping containers, culminating in the current solid fiberboards specifications, meant that component board producers were compelled to hard size to a degree far beyond anything previously considered practical. This was particularly true of V1s and V2s. Most mills reached their limit with conventional sizes, fortifying this result with smaller percentages of the more expensive types of size.

In many instances operating and sizing compromises resulted in a generally creditable performance, but the margin of safety was small and failures, especially during the summer months, were quite common. Sizing with an asphalt water dispersion, known as Flintsize No. 33, has aroused the interest of various manufacturers because of its dependability and superior sizing value.

This material is a water dispersion compounded from an especially "dry" petroleum base asphalt with a mineral colloid emulsifier. This combination assures a non-adhesive stock that avoids felt or screen soiling. The dispersion is available in drums or tank cars, which are protected against freezing, when necessary.

It is manufactured at a fluid consistency so that it may be poured easily into beaters or diluting tanks. It has been utilized at various points in the fiber preparation system with equal facility. The breaker beater, sizing beater, and finishing oil beater have all been employed successfully.

The size is precipitated or flocculated in the fiber by alum which may be incorporated in the stock at any later spot ahead of the vats. Dry feeders at the jordan intakes have been highly satisfactory. After adjustment, the pH should be maintained at 5.0 to 6.0.

It is a characteristic of the size that, contrary to the behavior of conventional sizes, water resistance of board increases progressively with increased amounts employed in the furnish. It is therefore possible to obtain a degree of water resistance in board far beyond that attainable by usual sizing methods. Certain types of wet machine board containing as high as 40% of asphalt size have been made highly waterproof by this means.

The size may be used on a board machine in the filler stock only, with conventional thin liners, or may be used throughout all plies, in which case the maximum benefits are attained.

Felts, cylinder molds, wet presses, and driers are not noticeably affected by paper containing 5% asphalt solids. Calendering stock containing the asphalt size in the liners is facilitated by the use of starch on the calenders.

One of the most valuable points about asphalt sizing with this emulsion has been the improved dry burst. In one mill, the strength of a 23-point lean furnish board had been running about 88 points, with conventional hard sizing including some wax, whereas the same furnish with asphalt averaged 101 points. Here only three of the five plies contained the asphalt. Another mill with a richer furnish was barely touching an expected average of 125 points, bursting strength, on 28-point, but secured 170 or better on shifting to the emulsion, where it was incorporated in the top and bottom liners as well as the fillers. In the latter case, possibilities of kraft fiber conservation and substantial economies are self evident. Inclusion of the asphalt sizing in the liners permits the fullest advantage to be taken of its best qualities with the usual unbalanced sheet construction.

When compared with normal hard sizing, the percentage water absorption or immersion number is not greatly improved until 8 to 10% of the emulsion is reached. On the other hand, the wet bursting strength, after the absorption of an equivalent amount of water, is always favorable to the asphalt, e. g., with identical furnishes in each case averages of many tests showed:

	Conventional Sizing	Asphalt Emulsion
Wet bursting strength (28-point), 10 min., points	80	120
Wet bursting strength (23-point), 2 hr., points	24	32
Wet bursting strength (23-point), 24 hr., points	19.3	28

These figures still do not tell the whole story because tests several days later indicated improved wet strength and smaller immersion numbers for the asphalt sized components with no change in the others. Additionally, when combined with V board the advantages of the size were still further magnified, giving wet strengths with a wide margin of safety where formerly failures or "near misses" were the rule with richer furnishes.

In the final analysis, the long range experience of one board mill provides the answer to the best quality V board at the lowest overall costs. With a background covering the entire 1944 calendar year, the wet bursting strengths for V2s were averaging 440 during the first part of the year with conventional sizing. Switching to asphalt sizing about midyear, the wet burst on the combined board with leaner furnishes in the components jumped to an average of 540. At the same time, the total cost of the finished board showed a 15% drop despite increased costs for materials, labor, and sizing.

The factors responsible for this favorable situation were: (1) Higher operating speeds with the reduced foaming and better formation; (2) Reduced alum consumption; and (3) Leaner furnishes.

Sodium Aluminate and the Sulphate Ion in Paper Sizing

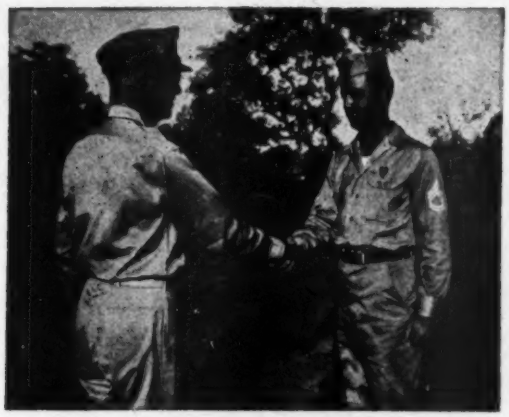
WILLIAM S. WILSON, Research Director
Monsanto Chemical Co. (Merrimac Division)

If sodium aluminate is added to a papermaking stock containing ordinary rosin size, no sizing will be obtained. Pulp is a cation exchanger almost always found in its calcium or sodium form. In a previous paper, the author has shown how to convert it to its hydrogen form. Rosin size is also a cation exchanger, always found in its sodium form, and in addition carrying a relatively enormous amount of excess alkali. Rosin in a beater consists of discrete particles of such size that probably not over 5% of the acid groups are actually on the surface, the remainder being in the interior of the particles. Size is generally made with at least 70% of the theoretical amount of alkali. Therefore,

$$\text{there is } \frac{70 - 5}{5} = 1300\% \text{ excess caustic}$$

in ordinary low alkali commercial size. This is why there are frequent instances of the more size used the lower the sizing. There is no practical way of avoiding this difficulty, but it is there nevertheless.

There is a very practical laboratory method for circumventing this trouble. Rosin can be dispersed by the rapid dilution of an alcoholic rosin solution. Thus, by acid washing the pulp and using alcoholic rosin, a beater can be started which not only contains no alkali but actually contains considerable amounts of potential H ions on the anions, pulp, and rosin. If sodium aluminate is added to such a stock, sizing appears at once and rises to a maximum as the amount of sodium aluminate is increased. Further additions of aluminate decrease sizing which eventually becomes zero when aluminate has



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American Industry well merits a decoration for its brilliant record in the Mighty 7th! But, as our newly decorated Pacific heroes quickly return to combat, so industrial leaders aren't resting on their laurels. *Back into Bond action*—they are now busy consolidating recent Payroll Savings Plan gains!

***First,* many executives are now patriotically working to retain the substantial number of new names recently enrolled during the 7th War Loan. By selective resolicitation, they are urging all new subscribers to maintain Bond buying allotments.**

***Second,* many are also employing selective resolicitation to urge every worker who increased his or her subscription in the 7th to continue on this wise, saving-more-for-the-future basis.**

Help to curb inflationary pressures and harvest peacetime prosperity by holding the number of Payroll Savings Plan subscribers—and amounts of individual subscriptions—to the mark set in the Mighty 7th!

The Treasury Department acknowledges with appreciation the publication of this message by

THE PAPER INDUSTRY and PAPER WORLD

★ *This is an official U.S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council* ★

been added to bring the pH up to around 9.

If Al ions are believed to be the active principle in engine sizing, it must be believed that the potential H ions on the pulp and rosin converted the alumina in the aluminate to Al ions because no sizing was obtained when the pulp and rosin were in their sodium form.

Eventually, the alkali added with the aluminate built up to the point where OH ions were added faster than the pulp and rosin, rapidly being exhausted of potential H ions, could kill them off.

Beater alkalinity is a nuisance because it necessitates the addition of SO_4 to get down to optimum sizing pH. The more alkali present the more SO_4 it is necessary to add and the more that is added the lower becomes optimum pH. In papermaking, tremendous volumes of water are involved. Large amounts of H ion are needed to drop the pH of these large volumes of water. As the pH scale is logarithmic, a change of 3 pH involves a thousand fold increase in H ions. The principal source of H ions must be accompanied by an equivalent amount of SO_4. A 3 pH in optimum then involves a thousand fold decrease in one of the principal H ion demands and a corresponding decrease in SO_4 added. As these effects work together, it should not be difficult to attain a 3 pH rise in optimum. It is easy to attain with a mixture of alum and sodium aluminate. The 30% high basic alum is particularly advantageous because one-third of the alumina present is free from SO_4. This free alumina is better than that in sodium aluminate because the latter is necessarily accompanied by its quota of deleterious alkali.

When optimum sizing pH is low, considerable alum is required to lower the pH of the large volumes of water used in the papermaking process. Sizing at high pH is desired, to eliminate the necessity of lowering the pH of large volumes of water, to produce more permanent paper, and to reduce the corrosion of the paper machine equipment.

Since maximum sizing at high pH is obtained only with a low SO_4 ion concentration, a high basic alum is required. A high basic alum made with alum and caustic soda or soda ash is of no benefit since it still contains just as much SO_4 ion as the original alum. A combination of alum and sodium aluminate, however, does meet the requirements of a truly basic alum in which the SO_4/Al_2O_3 ratio can be lowered to any desired point. A hypothetical example may make this more clear. A mill is using 2% rosin, 3.1% alum, and 0.875% of caustic soda to bring the pH up to 6.0. The basicity (based on Al_2O_3/SO_4 ratio) of this alum is 4%, the same as it was before the caustic soda was added. The same pH and alumina concentration can be obtained with 1.5% alum and 0.5% sodium aluminate but this mixture is 53.5% basic. The difference in the amount of SO_4 introduced in to the system is considerable. The use of 3.1% alum and 0.875% caustic soda adds 43.2 pounds of sodium sulphate for every ton of paper produced whereas the use of 1.5% alum and 0.5% sodium aluminate adds only 20.8 pounds of sodium sulphate per ton of paper.

This is an abridgment of paper presented at the annual meeting of the **Technical Association of the Pulp and Paper Industry**, held in New York City, February 14-17, 1944.

Resinous Materials in the Processing of Paper

JOHN Y. KAO,[1] LEON GOLD,[2] ASHWORTH STULL,[3] ROBERT WORDEN,[3] and WILLIAM ABRAMOWITZ[4]

With paper as a base or matrix, synthetic resins and allied substances are being applied to yield combinations of protective, decorative, and dielectric properties which can be varied almost at will. This report will outline the tremendous activity in the field of processed papers in the following order: first, the military and important civilian uses; secondly, properties to be imparted; thirdly, adhesives for paper; and finally, principal methods of treating, coating, lamination, and impregnation. Some original work will be presented on the use of synthetics in impregnation.

The military requirements involving the use of paper and the manner in which these requirements have been met have not been as spectacular to the public imagination as the conquest of synthetic rubber, high octane gas, or the use of block busters, but in its multitudinous applications and in its ingenuity, the paper industry may be proud of its contribution.

(1) Director, Latex Labs., American Resinous Chemicals Corp., (2) Director of Research, Milprint Corp., (3) Chemist, American Resinous Chemicals Corp., (4) President, American Resinous Chemicals Corp.

USES

Ordnance wrapping — This is one of the outstanding packaging achievements of the war. Machine parts, motors, guns, and even tanks are wrapped in moisture vapor resistant combinations of paper, resins, metal, and plastic films, eliminating the necessity of greasing the parts. This saves subsequent degreasing and reassembling. Complete operating units can be delivered to a beachhead or operating area where the immediate utility of materials is the important consideration.

Waterproof liners — This problem is still not entirely solved. Chemical warfare service demands are particularly stringent. In the form of paper sheets the properties seem satisfactory, but in actual service in lined boxes, they are not yet quite right.

Medicines — Millions of packages had to be made available quickly. Kraft — asphalt — foil — cellophane — topped with heat seal coatings are widely used.

V Boxes — An approximation of the demand may be seen from the fact that the Navy alone expects 75,000,000 for export this year.

Tapes — A great deal is heard about red tape these days, not as much about the pressure sensitive, heat sealing, and other tapes that are more important in war packaging problems. There are tapes that are waterproof, airproof, greaseproof, nonshrinkable, resistant to sea air, salt spray, war gases, solvents, oils, greases, and chemicals; tapes that reinforce, laminate, identify, mask, mend, decorate, splice. Many will withstand impact. All exposed parts of a plane are sealed with tapes. Tapes prevent ice from forming in gun barrels and sand from clogging tanks. Artillery ammunition containers sealed with colored tapes assist gunners in loading the right shells; back in the paper mill, tapes are used to splice rolls.

Some of the civilian uses of processed papers are: artificial leather, packaging, shoe soles, and wall paper.

Moisture vapor resistance—All materials in thin films permit the passage of water in vapor form. One way of distinguishing between waterproofness and moisture vapor resistance is to consider that liquid water enters through interstices between the cellulose fibers whereas moisture vapor may be transmitted along the fibers themselves. Asphalt impregnated kraft is noted for waterproofness, but is inadequate in moisture vapor resistance for even four months in the tropics. It is also too soft in warm weather and too brittle in cold. Metals, of course, corrode readily in the presence of moisture. Foods and chemicals are liable to speedy destruction, dehydrated foods being particularly sensitive. Wax, asphalt, and combinations impart the greatest degree of resistance. These may be incorporated in emulsion form into beater and the paper later coated. In combat zones where there is danger of fire from torpedoes or incendiaries, it is often necessary to turn a water hose on packages, and they may be left soaking for many days. This illustrates the need for resistance to moisture vapor and water.

Grease resistance — This is obtained by coating, laminating, or impregnating with water soluble materials such as glue, gelatin, starch, casein, polyvinyl alcohol, alginates, or methyl cellulose. Resinous substances as zein, polyamides, vinyl copolymers, cellulose esters and ethers combine grease resistance with an increased measure of water resistance.

Acids and Alkalies — High degrees of resistance are obtained with vinyl chloride, the acrylics, polystyrene, ethyl cellulose, thermosetting phenolics, and urea formaldehydes.

Solvents and Chemicals — Polyvinyl alcohol, vinyl chloride, and thermosetting resins are resistant to a wide variety of solvents and chemicals.

Scuffing and Abrasion — The hard, tough plastics such as vinyl chloride or copolymers, baking varnish, enamel, etc., are used for this purpose.

Resistance to Gases — Cellophane laminated to kraft has shown good promise against war gases. Certain phenomena require further explanation. Why does carbon dioxide, a comparatively heavy gas, pass through rubber hydrochloride four times as fast as air? Further polyvinyl al-

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TABLE VI—RESISTANCE OF VARIOUS FILMS

	Acids	Alkalies	Alcohol	Gasoline	Oils and Greases	Electrical	Flammability	Heat Seal	Water Vapor Perm.
Acrylic Resins	G	G	P	F	F	G	Low	E	F
Casein	P	P	F	E	E	P	Very Low	None	P
Cellulose Acetate	F P	P	P	P	G	F	None	F	P
Cellulose Ethyl	F P	E	P	P	F	G	Low	G	P
Cellulose Methyl	F	F	P	E	E	F	High	None	V P
Chlorinated Waxes	E	E	Vary with type		P	E	None	G when combined with film forming thermoplastic resin	G
Diphenyls, etc.	(Inorganic)								
Nitrocellulose	F P	P	P	G	F	F	High	F	G
Polyamides—Norelac—Arlac	P	F	P	P	E	F	F	E	F G
Polybutene	E	E	E	P	E	E	Low	E	G
Polystyrenes	E	E	E	E	E	E	Low	P	P
Polyvinyl Acetate	G	G	P	G	G	F	Low	E	P
Polyvinyl Alcohol	P	P	G	E	E	G	Low	None	P
Polyvinyl Butyral	P	F	P	G	E	G	Low	E	P
Polyvinyl Chloride	E	E	E	E	E	E	None	E	P
Polyvinylidene Chloride	E	E	E	E	E	E	Low	Special process	G
Rubber Chlorinated	E	E	G	P	P	G	Low	G	E
Rubber Cyclized	E	E	E	P	P	G	None	E	E
Urea Formaldehyde	F	F	F	E	E	G	Very Low	None	P
Vinyl Copolymer	E	E	E	E	E	E	None	E	F

E—Excellent. G—Good. F—Fair P—Poor.
* Resistance of finished coating to chemical agents is most often dependent upon modifying agents used in formulation.

cohol substantially excludes oxygen and carbon dioxide but allows water vapor to pass quite freely. One explanation may be that the water dissolves in the polyvinyl alcohol and evaporates through the other side. A study of these phenomena will be useful for lamination and coating problems. Gasproofing is one of the recent developments and not very much information is available.

Insects — Materials toxic to insects and micro-organisms, such as halogenated waxes, copper salts, zinc borate, etc., are incorporated in the resin compositions. One clever proposal which offers promise is the incorporation of a ply of sandpaper.

Tear Strength and Wet Strength — Tear strength is obtained either by lamination or impregnation with emulsions such as reclaim, vinyl, acrylic, alkyd, and the natural or synthetic rubbers. Wet strength papers from urea, melamine, or phenol formaldehyde resins incorporated in the beater have been described elsewhere. In tub sizing, these resins may be used with other film formers such as methyl cellulose.

Flexibility—Thermoplastic resins or rubbery materials are either incorporated in the beater or impregnated into the sheet stock.

Heat Seal — This is rapidly replacing the conventional method of gluing in the formation of bags and packages. Its advantages include strength of glued bond, packaging appearance and packaging speed. Thermoplastic resins such as vinyl acetate, ethyl cellulose, polyamide, and polybutenes, because of their inherent properties and film strengths, are used for this purpose. One problem here is to determine where the heat seal coating is; tinted seals are now available. Electronic heat sealing is one of the latest developments in this field.

Pressure Sensitivity — Nonblocking papers capable of combining only with their own treated surfaces are required for laundry wraps, tapes, and miscellaneous packaging problems. For this purpose, the natural and synthetic rubbers, vinyl and acrylic resins are used.

Protection of Printed Matter — Synthetic coatings are applied over printed surfaces for protection against abrasion and marring for labels, covers for laboratory and cook books, instruction manuals, and the like.

Heat-Pressure Convertibility — Thermoplastic resins of high melting point or thermosetting ones such as urea or phenol formaldehyde are either incorporated in the beater or impregnated into the sheet. Upon molding and curing under heat and pressure, rigid products are obtained for boxes, dishes, ammunition kits, etc.

Electrical Insulation — Paper may be impregnated with dielectric materials such as chlorinated oils, or coated with styrene, acrylic or ethyl cellulose.

Decorative Purposes — For beauty and protection of gift wrappings, playing cards, table tops. Almost any available film-forming material is used.

Another important use is flameproofing where inorganic salts with and without resin binders are utilized.

Especially important on the list of materials available to the paper processor are the monomers; these are something to watch for future developments. Extremely interesting effects have been obtained by coating or saturating fibrous materials with monomeric resins or their dispersions as vinyl acetate and polymerizing in situ.

Table VI shows the resistance of the resins to various chemical agents; Table VII shows some moisture vapor transmission rates, all of these being in general suitable for method II ordnance wrapping. Table VIII presents some data on gas permeability; and Table IX shows where the resins are most widely used.

ADHESIVES

The war has accelerated the manufacture of adhesives from an art to a science; the chemical and physical natures of the substances to be joined are now being considered. Some of the factors involved include chemical action of the adhesive components on surfaces, wetability, adhesive and cohesive forces, porosity, machinery, speed of application, and perhaps most important, the factors to which the laminates are to be subjected — water, solvents, oils, chemicals, and stresses. In mechanized operations, the application of excess adhesive is frequently as bad as the application of too little. In some cases, a diluted solution of adhesive is used as a first coat, allowed to dry and a second coat of adhesive applied. In laminating with metal foils a trace of acid or alkali in the adhesive frequently gives better grasp. If one of the sheeting materials shows a tendency to get brittle, a properly selected laminating agent can insure flexibility. Adhesives can also be formulated to inhibit mold and insect infestation. One laminator has turned out a sheet which comes very close to being a one-way glass; with the light at the observer's back it has the characteristics of a mirror and when held up to the light, it surprisingly enough becomes a transparent sheeting. Laminations have been extended to carton stock; for example, clay coated box board is being laminated to cellophane, glassine, and coated papers. No package being stronger than its seal, the technique and machinery of adhesive application frequently require modified operations and a willingness to experiment. To show the variations required, adhesive companies have as many as 200 formulations for the paper industry alone.

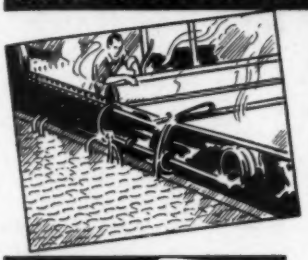
Synthetic resins, rubbers, and waxes may be applied by any of three methods, i.e., solutions, emulsions and hot melts and calendering. Each has its advantages which are dependent upon the properties of the resin, the type of machinery available, and the cost.

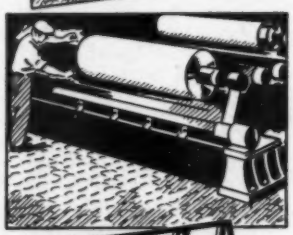
In applying solutions, it is generally desired to have a fairly high solid content with low viscosity. Some surfaces need the attacking influence of solvents to promote adhesion. Solution application includes spirit varnishes, generally natural gums dissolved in alcoholic solutions, overprint varnishes of the drying oil or baking type, lacquers, and resin solution. The use of emulsions eliminates the need for solvents, provides better adhesion for certain surfaces, controls penetration or lack of it,

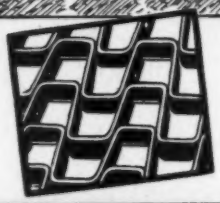
TABLE VII—MOISTURE VAPOR TRANSMISSION RATES

Film	G./100 Sq. In./24 Hr.
Aluminum foil laminated to glassine	.03 to .10
Waxed glassine	.2 to .6
Saran (.002 in.)	.10
Number 140 PID laminated pliofilm	.31
450 moisture-proof cellophane	.5 to 1.0
Paper coated with vinyl copolymer	2.5
Rubber hydrochloride PD-140	.3

HEAVY DUTIES REQUIRE ENDURING LEVEL FLOORS







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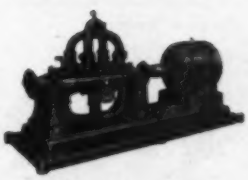
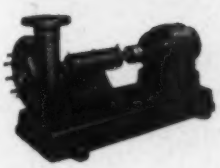
★ Complementing the eminent line of Peerless *Vertical* Turbine, Hi-Lift, Hydro-Foil, Jet and Water King Pumps, Peerless now manufactures *Horizontal* Centrifugal Pumps, formerly Dayton-Dowd.

Peerless has acquired the Dayton-Dowd Company of Quincy, Illinois, which henceforth will be operated as the Quincy Works of Peerless Pump Division



So now, regardless of the type of pump you need—Peerless produces it giving you choice of *vertical* or *horizontal* design, plus augmented hydraulic engineering service.

Advise us as to the type of pump desired—whether vertical or horizontal—capacity and lift. We will be pleased to submit full specifications and engineering details.



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PEERLESS PUMP DIVISION Food Machinery Corp
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and permits greater concentration of solids. Using hot melts eliminates solvents and drying problems and increases production rate.

IMPREGNATION

The comparative evaluation of latex, dispersions of reclaim rubber, acrylic, vinyl, alkyd resins, and their mixtures for paper saturating and sizing was presented before TAPPI by Nazzaro in 1942. Paper saturated with these materials is used extensively in the manufacture of artificial leather for luggage, belts, book covers, etc., in the preparation of shoe stock as solings, or sock linings, and for war packaging, camouflage materials, and metal replacements. Briefly, this involves the impregnation of paper in an emulsion bath containing 10 to 15% solids, to deposit within the paper 15 to 30% solids, and subsequently drying, calendering, or pressing. This work has been continued with other resins and the synthetic rubbers.

In preparing the impregnated stock, the resinous dispersions or emulsions were sensitized in order to insure uniform adhesion of the alastomeric bodies throughout the fibers. Nazzaro in his papers pointed out the interesting phenomenon of different resins showing varying degrees of migration toward the surface of the paper. Sensitizing the dispersions assists in preventing resin precipitation on the surface and helps to insure the actual deposition of the resins in the sheet under the influence of the drying conditions. This sensitization was accomplished with the use of the water soluble complexes of polyvalent metal ions and ammonia plus appropriate wetting agents and protective colloids. The paper stock was saturated according to the standard impregnating procedures and heated slightly to regenerate the divalent ions which in turn set the particles uniformly on the fibers.

We have studied the relative merits of the synthetic rubbers as compared with alkyds, vinyl, and styrene. For burst, tear, and tensile, ester gum and alkyds are inferior. Where these properties are not important, the alkyds, because of their relative cheapness, are used as extenders. Another important result is that synthetic resins can be made to approach the properties of the synthetic rubbers. Plasticized styrene and vinyl acetate can be made to show properties approximating those of Buna, Neoprene, or Hycar.

For proper use of synthetic as well as natural rubbers, compounding is necessary. Recent work has improved the compounded latices to 25% and 40% over the uncompounded. The treated sheets improve with age.

TABLE VIII—GAS PERMEABILITY

	Air, cc./100 sq. in. 24 hr.	Carbon Dioxide, cc /100 sq. in. 2/24 hr.	Moisture Vapor, gm./100 sq. in. 2/24 hr.
Polyvinyl alcohol, 0.002 to 0.003 in.	0	0	10 (minimum)
Rubber hydrochloride, PO-140	6	25	0.3
Polyvinylidene chloride, 100 gauge	0	0	0.17
Glassine, 0.001 in., single ply	5	..	....
Glassine, two-ply laminated	0	..	....
Polyvinyl alcohol coated on paper			
1 Coat	Rapid leakage	..	....
2 Coats	Approx. 1000	..	....
3 Coats	0	..	....
25 pound Glassine	1500	1300	....
Same glassine with pliolite both sides, 1.5 lb./ream	8	300	....
Cellulose acetate	10	1300	....

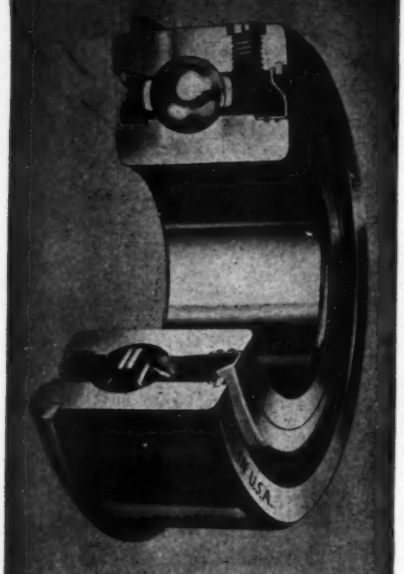
TABLE IX—APPLICATION OF VARIOUS RESINS

Resin	Applications
Acrylic Resins	Heat sealing: Water-, acid-, alkali-resistant paper coatings. Wax hot melts.
Alkyds	Principally used with cellulose derivatives. Per se in high gloss overprint varnishes. Emulsions in impregnation for artificial leather.
Alphalts	Moistureproof laminants for kraft liners. With rubber as moistureproof adhesive.
Casein	Paper coating for lithograph work, magazine and other printing; adhesives; greaseproof coatings for containers and food packaging papers; high gloss lacquers.
Cellulose Acetate	Oils, grease-resistant packaging papers; tough with low inflammability; no good cheap solvents available.
Cellulose Ethyl	Laminating agent for paper, metal foil and cellophane for general food packaging; paper label coatings; high gloss decorative coatings; alkali-resistant coatings for soap wrappers; heat sealing bags and packagings. Wax incorporated for moisture vapor resistance.
Cellulose Methyl	Adhesives and sizings for paper; surface size under lacquers and waxes, for label and glass ink printing papers; grease-proof coatings.
Cellulose Nitrate	Widely used, very cheap; when properly formulated gives good grease-resistance, water-resistance, and heat sealing cellophane coatings. General for boxboard labels, advertisement, wrappings, menus, etc. Disadvantage—inflammability.
Chlorinated Waxes. Diphenyls, etc.	Moistureproof protective coatings; fireproofing agent; plasticizers; insulating and dielectric paper
Coumarone-Indene resin	Principally as modifying agents.
Natural Gums (Shellac Rosin) and Derivatives	Lacquer coatings, adhesive and laminating agents added to waxes to improve adhesion.
Nitrocellulose	Paper label coatings; heat sealing moistureproof coatings for regenerated cellulose; general coating for boxboard, labels, advertisements, menus, etc.
Polyamides Arlac—Norelac	Heat sealing, grease-resistant coatings for glassine, foil, cellophane; laminating agents for glassine to glassine, paper to foil, etc. Good low temp. flexibility.
Polystyrene	Waterproofing agents; chemically resistant paper coatings. Brittleness its major handicap.
Polyvinyl Acetate	Best use as adhesive, pressure and heat seal coatings; laminating adhesives; greaseproof coatings for packaging of dehydrated food.
Polyvinyl Alcohol	Grease-resistant papers and fiber containers for oils and greases; coating for protecting oil paints in fiber containers; extensive use by C.W.S. for mustard gas resistance; size for fine papers With glassine confers XL transparency, high burst and tear.
Polyvinyl Butyral	Heat sealing coatings and adhesives; pressure sensitive tapes; poor moisture-resistance and cost limit use.
Polyvinyl Chloride	Chemical-solvent-resistant coatings; waterproof coatings. Poor solubility. Applied by calender.
Polyvinylidene Chloride	Moisture vapor- and chemical-resistance films for packaging guns and metal parts for export shipment; its use in coatings being investigated.
Polybutene	Heat sealing, moisture-resistant paper coatings and laminating adhesives. Used in wax hot melts to increase bond strength.
Polyvinyl Copolymer	High gloss abrasion-chemical-resistant coatings for labels, cap liners, paper packages, hood closures for milk bottles, linings for beverage and fruit juice containers; heat seal coating for foil; greaseproof coating for packaging of dehydrated foods. Paraffin wax in small quantities to increase M.V.R. New application is solvent suspension.
Rubber Chlorinated	Miscellaneous protective coatings; moistureproof coatings and adhesives; not good for heat seal. One of the few resins capable of laminating pliofilm to foil. Used for coated tagstock, and plan and vegetable markers because of mold-inhibiting properties.
Rubber Cyclized	Produced by treating rubber with SnCl. High solids solutions of low viscosity. Clear glossy films good adhesion cellophane, glassine, foil, acetate XL M.V.R., chem. adhesives and laminating agents, coatings for labels and outer wraps for food; wax melts used on cheese wraps, milk, fruit juice, bread wraps, etc.; heat sealing paper bags for packaging chips, etc.
Urea Formaldehydes—Melamine	Solvent- and chemical resistant papers, such as cap liners, manufacture of wet-strength papers; face tissues, shipping tags, boxes, containers. bags, maps, and blueprint papers.
Waxes	Paraffin derived from distillates M.P. 100° to 150° F.; amorphous from residual stock M.P. 140° to 200° F.; more flexible, better tack and adhesive properties; wax best M.V.P.; waxed papers, food rations, internal protective coating for collapsible paper tubes. Also lead foil lined.
Zein	Grease and scruff resistance, base under wax; heat sealing and laminating hot melt adhesives.

DOUBLE YOUR GREASE CAPACITY—SIMPLIFY DESIGN—with

"Cartridge" Ball Bearings

(Patented)



"CARTRIDGE" Ball Bearings have been adopted by hundreds of firms in many lines of industry.

SOME OF THEIR ADVANTAGES:

Can be packed with at least 100% more grease than any self-sealed bearing — especially adapted, therefore, for continuous service for long periods.

Provide positive protection against foreign matter and absolute retention of lubricant—by the use of flanged metal shields, recessed inner ring construction, and two or more grease grooves—the combination affording a truly effective labyrinth.

Are equally efficient in retaining grease in horizontal or vertical position.

Metal shields, though rigidly locked by snap rings, are removable to facilitate inspection, cleaning or re-greasing of bearings.

Can be quickly regreased, either through "built-in" refilling plug opening or by removing metal shields.

Require no lock nuts on shaft or clamping means in housing, because of wide contact areas due to double-row width of both rings —which also prevent "cocking", slippage or "peening".

Reduce costs by simplifying design, eliminating protective closure parts, and saving attendant labor.

Available with shoulder ring, thus permitting a through bore in housing, the shoulder ring providing endwise location.

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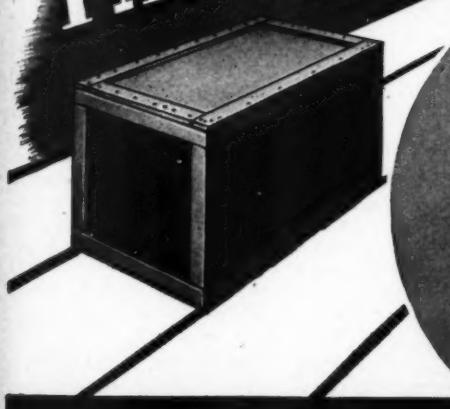


Inside this box is an Orr felt, clean and flawless. It's no ordinary box for it is free from splinters . . . it is strong . . . and it is so constructed that no protruding nails can damage the valuable contents.

At Orr we take great pride in the "little things" such as correct packaging, storing, mothproofing, etc. And we feel that our interest in Orr felts rightly extends into your own mill.

That's why we have instructed our representatives to be of the greatest possible service to you. The next time one calls, allow him to examine your felt handling methods and make any suggestions.

ORR FELTS

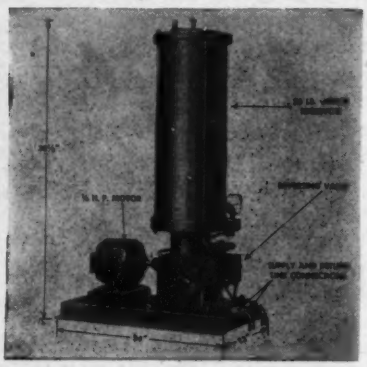
THE ORR FELT & BLANKET CO.

PIQUA, OHIO

NEW EQUIPMENT AND SUPPLIES

Automatic Pumping Unit for Centralized Lubrication

The Farval Corp., 3249 East 80th St., Cleveland 4, Ohio, has announced Automatic Central Pumping Unit DC-25—a small, double plunger, slide valve type of pumping for the handling of all types of lubricants. The unit delivers lubricant under pressure to all bearings in the system through two main supply lines



serving a measuring valve (Farval Dauline) at each bearing. Frequency of operation is controlled by an electric time clock. A signal device is available to indicate any interruption to the normal operation of the system.

For individual machine lubrication, this central pumping unit can also be furnished with rotary drive and with hydraulic timing. With this arrangement, the unit will start and stop with the equipment served.

Pressure Gauge Tester

Mansfield & Green, Cleveland, Ohio, has announced a pressure gauge tester which can be used both for bench testing and for portable testing in the field. On bench testing, the unit can be used with test gauges or with a dead weight attachment.

According to the announcement, a unique, but simple, doubly-sealed check valve eliminates leakage and loss of pressure even with grit in the system, whether using oil or water and for pressures up to 10,000 psi.

Principal uses of the testing unit, suggested by the manufacturer, include testing and repairing of pressure gauges and instruments, the setting of relief or other pressure actuated valves and general hydrostatic testing.

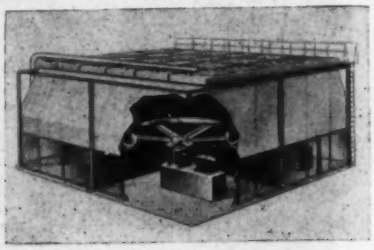
High Lift Pop Valve

Farris Engineering Co., Palisades Park, N. J., has announced a high-lift pop-relief valve for pressures up to 300 lb. This valve, designated as type #1800, is built with an adjustable single blow-down ring which permits regulation of the amount of pressure to be relieved on individual operations. The valve is also available with a hand wheel for adjustments on jobs requiring frequent changes of operating with packed adjusting bolt under a protecting cup for gas service. Other applications than gas include steam, air, water, and other liquid process lines.

Fin Fan Cooling Unit

The Fluor Corporation, Ltd., 2500 South Atlantic Blvd., Los Angeles 22, Calif., has announced a cooling unit, designated as the *Fin Fan*, for a wide range of applications. Cooling sections of the unit employ K-fin tube construction. These sections are cooled by air supplied from forced draft fans operating at ground level. The fans are equipped with variable pitch blades and with variable speed drive.

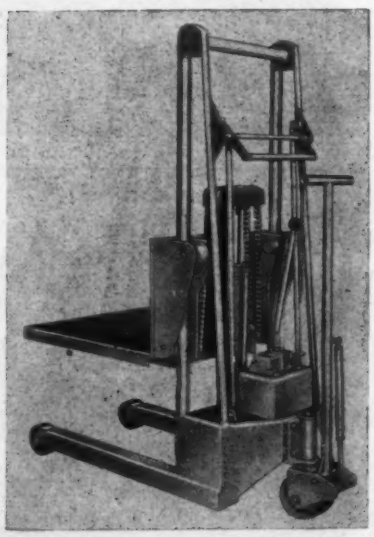
Other features of the design covered by the announcement are: vertical air flow against static head assures even air distribution over cooling surface; not affected by prevailing winds; can be designed for pressures up to 5,000 psi and for temperatures up to 1500 Fahr.; easy accessibility for maintenance; sufficient static head for pump suction, easy cleaning and replacing of K-fin sections; and multi-fan cells assure continuous operation in case of failure of one fan.



The unit embodies the combined experience and engineering skill of The Griscin-Russell Company, and The Fluor Corporation, Ltd.

Combined Lift and Tiering Truck

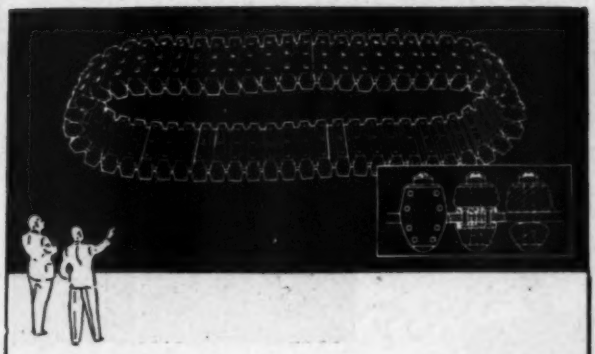
Lyon-Raymond Corp., 1616 Madison Street, Greene, N. Y., has announced a hand-operated, combination lift truck and



tiering machine. The truck is of tubular and formed steel construction. It is Timken bearing equipped, has a controlled finger tip lowering device, and weighs 495 lb. The standard model has a platform 24 in. wide by 30 in. long. It has a raising range of 42 in.—6 in. lowered to 48 in. elevated. This model has a capacity of 1000 lb.

Portable Speed Indicator

Chicago Electric Tachometer Co., 800 North Clark Street, Chicago 10, Illinois, has announced a small, self-energizing, highly accurate speed indicator for measuring speeds of rotation or surface speeds. Designated as Model 5-E Tachometer, the instrument may be equipped either with a rubber tipped shaft for obtaining readings



You naturally expect this perfected Double-Block V-Belt from Lewellen . . .

speed control pioneers

● This famous drive is an outstanding feature of Lewellen Variable-Speed Transmissions. Here's why: (1) It gives smooth, dependable performance by transmitting the rated load with less tension upon the belt, bearings and shaft. (2) It reduces slippage to a minimum. A single tip of top-grade leather covers the ends of both the inner and outer blocks as well as the space between the blocks. Since the face of the tips is not ground, the full wearing value of the hair side of the leather is preserved. The result: long life of the belt is assured and a maximum frictional contact with the discs, as it is a perfect V-belt drive. (3) It combines with other patented Lewellen features to make the finest of variable-speed transmissions. Look to Lewellen!

LEWELLEN MANUFACTURING CO.
COLUMBUS, INDIANA

James Watt (1736-1819) perfected Newcomen's steam engine and adapted it to drive machinery of all kinds. Illustration from Bettmann Archive.

JAMES WATT
Perfected the Steam Engine in 1781

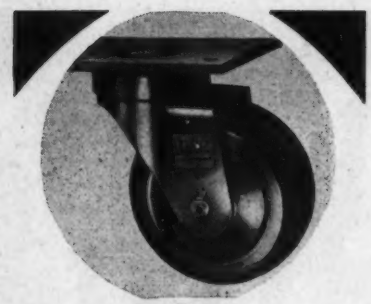
"One Sunday morning" wrote James Watt, "the idea occurred to me that steam would expand and rush into a vacuum." At that moment the modern steam engine was born in Watt's brain—a flash of genius for which all mankind is thankful.

About the time steam engines came into general use nearly a century later, Garlock began manufacturing packings to improve their operation—and today Garlock supplies packings and gaskets for millions of engines now in use throughout the world.

The Garlock Packing Company, Palmyra, New York
In Canada: The Garlock Packing Co. of Canada, Ltd., Montreal, Que.

CHEVRON PACKING is one of the many Garlock quality-controlled packings. The unique hinge-like design allows the packing to expand and contract—it adjusts itself automatically to variations in pressure.

Garlock



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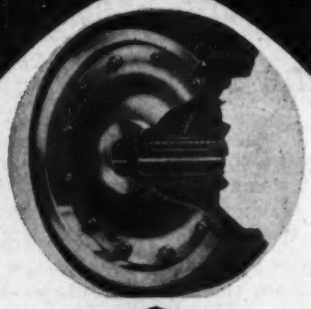

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Manual

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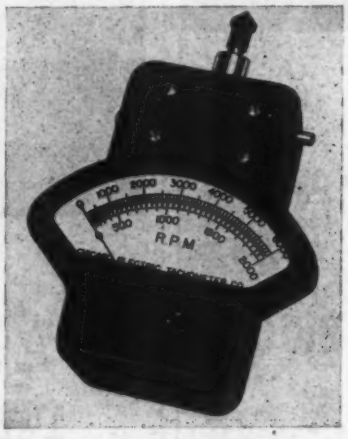
in rpm, or with a wheel for measuring surface speeds. The instrument is so designed and constructed that normal machine vibrations do not interfer with steady, accurate readings.

To obtain a reading in rpm, it is only necessary to press the rubber tipped shaft of the instrument against the revolving object. The speed is indicated instantly on a scale over three inches long.



Similarly, when surface speed is desired, a wheel equipped instrument is pressed lightly against the moving object, such as a web of paper or paperboard, and the speed is indicated in fpm.

The over-all body dimensions of the instrument are 2⅜ in. by 2⅞ in. by 5 in.

New 2000-Hp. Motor

A new 2000-hp. Tri-Clad motor, the largest to be added to the line, has been announced by the Motor Division of the General Electric Company, Schenectady, N. Y. The new motor is of the squirrel-cage induction type. Operating at 1800 rpm, it is rated 2000 hp., 2300 volts, 3 phase, 60 cycles.

The motor incorporates such basic protective features of the Tri-Clad line as protection against physical damage; electrical breakdown, and operating wear and tear. The end shields are of split cast-iron construction to facilitate maintenance and provide resistance to rust, corrosion, accidental blows, and rough use.

Screw Pump for Thick Liquids

Sier-Bath Gear Company, 9266 Hudson Boulevard, North Bergen, N. J., has introduced a screw-type displacement pump for the handling of thick liquids of both the lubricating and non-lubricating type. It is recommended by the manufacturer for the handling of such materials as Bunker C Fuel Oil, asphalt, greases, etc.

Among the features cited for the design by the manufacturer are the following: no

pulsation or vibration in flow from pump; extremely low maintenance; occasional packing ring renewal made while pump is in service; side wear of screws, resulting from contact while pumping, prevented by self-centering Herringbone gears; and thrust bearings eliminated in horizontally mounted units by end to center flow of fluid.

Copper Napthenate Wood Preserver

Quigley Company, 527 Fifth Avenue, New York 17, N. Y., has announced a wood preserver which can be applied by brush, spray or dipping, and which, according to the announcement, will deeply penetrate and impregnate the wood, thereby sealing it against wood destroying organisms.

In using the preserver, which is known as *Triple-A Copper Napthenate Wood Preserver*, it should be allowed to dry for 48 hours before applying other paints or coatings for decorative effects. If white paint is applied over the primer, two coats should be used to thoroughly seal against bleed through. One coat of darker colors will usually color satisfactorily.

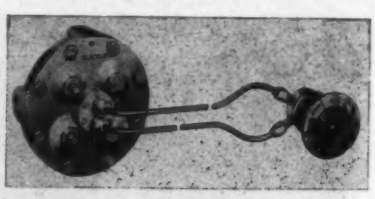
The preserver is non-poisonous to humans. It is green in color. All treated areas show plainly.

One gallon of the preserver will treat approximately 200 square feet of surface. The preserver is shipped in one-, five-, 30- and 55-gallon containers.

Four-Way Valve

A new four-way valve has been announced by Clayton Manufacturing Company, Alhambra, Calif. This valve is designed for application wherever it is necessary to control the flow of fluid by alternate supply and exhaust. Control may be manual, electric, or by float mechanism.

Where it is necessary to restrict the flow of pressure through the valve, lim-



iting screws are available. Thus, the rate of flow can be regulated to permit the operation of equipment at a controlled rate of speed.

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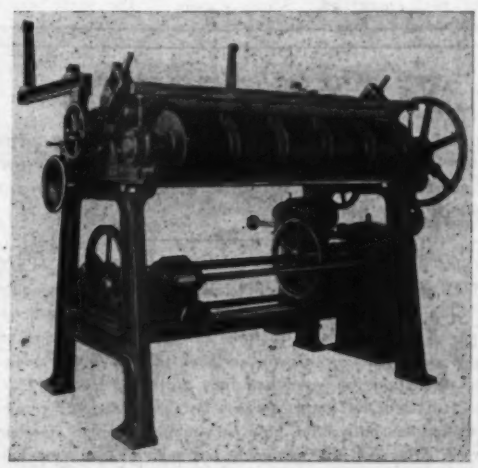

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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Ramie in Papermaking

The article gives a brief historical review and a discussion of the botannical aspects, culture, pests, diseases, harvesting, etc., of ramie and methods used for preparing the fiber for the market. Physical properties, uses, economics, industrial demand are also described. A pliable soft, yet tough and strong fiber is obtained by decorticating the green stalks in a suitable automatic machine and then degumming the fiber before the gum has dried. The fiber is lustrous and white even before bleaching. So as to avoid unnecessary hauling the decortication is best carried out with portable machinery in the field.

The fibers constitute only about 13% and the rest is waste. Dilute chemical solutions are used for degumming, and this step is brief (about 1 hr.). When degummed the fiber is baled ready for shipment. Dry clean fiber represents 97-99% cellulose on the dry basis and this has many textile uses. The high cellulose content and its unusual strength also makes the fiber suitable for very high grade papers for special purposes. For example: bank note and bond papers (where strength, rattle, elasticity and opacity are required) can be made from ramie. The waste from the fiber (leaves and stalk tops) is quite high in protein and could readily be used as cattle feed. A study of these wastes as sources of protein concentrates should be made. In the Manawul process the ramie stalks are dried before decortication and the degumming process requires two hours. The author gives 58 references. War Production Board, Office of Production Research and Development. Chemurgic Digest 4, No. 8, 137; 139-45 (April 1945).

The Drying of Ink

The present paper is a condensation of Bulletin 13 issued by the Lithographic Technical Foundation, on "The drying of lithographic ink." The drying process takes place in two stages; the so-called setting of the ink and the solidification of the ink vehicles by oxidation and polymerization. Proper ink setting depends upon the absorbency of the paper and upon the thinness or penetrating power of the ink vehicles. If this vehicle is too thin or if the paper is too absorptive, the print will chalk or powder. If the vehicles is too viscous or if the paper is not absorptive enough, prints will offset and stick or block. The stage of solidification of the ink vehicles, within practical limits, depends upon the correct use of the drier, the kind and amount of which is governed by the following: the pigment in the ink, reducers and non-drying compounds, the surface absorbency and the chemical reaction the paper, the temperature, moisture, the "fountain acidity," and the access of the air. Drying troubles are discussed and remedies are proposed to prevent chalking or powdering, offsetting, smudging, the sticking together of printed sheets, the drying of ink on rollers (but not on the sheet), the drying of ink on one type of paper but not on another, the drying of ink on the edges but not in the center, the drying on some sheets but not on others from the same pile, retarded drying, etc. Anon. Modern Lithography 13, No. 4, 28-9, 77 (April 1945); Nat'l Lithographer 52, No. 4, 19,34,60 (April 1945) through B.I.P.C. 15, No. 9, 340-1 (1945).

Total Lime Content of Sulphite Cooking Liquor

The sulphur dioxide is first replaced by HCl. The free acid in the resulting solution is titrated with NaOH. Thereupon a cationic exchange between the metallic ions and hydrogen ions is effected and the acid liberated in this way is again titrated. From the difference between these two titrations the lime content is calculated.

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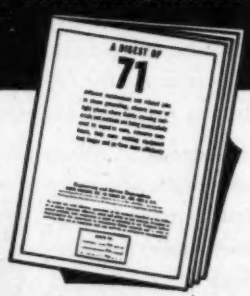

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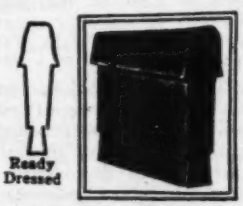

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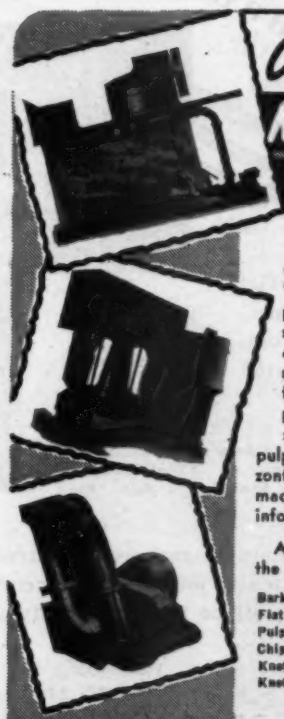

Ask US ABOUT NEW MURRAY EQUIPMENT

SHOWN here are three of the latest developments to aid paper mill production, pulp stock agitator for thorough and complete agitation of pulp stock in chests, paper machine flow spreader and new fan pump for handling diluted stock going into screens. The pulp stock agitator shown is horizontal design, but this can also be made in vertical design. Complete information is yours upon request.

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- Barking drums
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The error is less than 0.5% and the entire determination requires 20-30 min. The method may also be used in analyzing sodium bisulphite cooking liquors. Olof Samuelson Svensk Papperstidn. 48, No. 3, 55-6 (1945) through B.I.P.C. 15, 367 (1945).

Stress-Strain Curves of Paper

The stretching properties of paper under tension and its recovery were studied. The results expressed in graphs are all of a similar algebraic type both for stretch and for recovery. When these curves are superimposed, they show pronounced symmetry and many of the curves are practically coincident. No attempt was made to work out the equations from a dynamic consideration which would correlate the stretch and recovery with the many factors involved. However without offering any scientifice explanation, it was observed that the following equation fitted quite closely the data for a number of the graphs: S equals $F(L^2+5L)$ in which S is the stretch, L the load, and F is a factor varying for different papers. However it was indicated that it would be very difficult to determine how many variables and in what degree they go to make up "F." Hence it is practically impossible to arrive at a universal formula.

Certain forces however come in the stretching and recovery of paper which are common to all types, irrespective of furnish and of machine conditions. Furthermore, the graphs showing recovery are usually near enough to the rising tracks so that it can be fairly assumed that there is an exact reversal of the stressing process. Graphs that were obtained by successive loadings and unloadings very nearly shadowed one another, with a negligible increase in permanent set. It appears that the primary stressing, even up to what is close to the point of rupture, is largely a process in which the fibers slip over one another into positions of increased density, rather than to an extension of the individual fibers themselves. When once the state has been reached in which the permanent set has very nearly attained its maximum value, repeated stressing acts upon the fibers directly or upon the fiber bonds, and the paper appears to behave almost as a perfect elastic body (at least in relation to tension). Without conjecturing where the elastic limit (or yield point) is located, it may be assumed that it will not appear until successive stretching has actually injured the fibers.

A preliminary stretching treatment of finished paper (if it is designed to eliminate most or all of the permanent set) may be profitable in reducing or in overcoming some of the printing difficulties. For example it might help the printer using a cold multicolor photogravure process and it might find an application in certain types of foiling machines. Cellophane had little power of recovery from stress—in other words it was "dead." E. R. Gibbon. Paper-Maker 108, TS53-6 (1944), through C.A. 39, 1990 (1945).

Paper Yarns

Kraftcord, a paper yarn for the backing of rugs, etc., gave a satisfactory performance despite the fact that an untreated kraft paper was used. When wet-strength papers become available for civilian use, even better results are anticipated. In other words this development in the estimation of the author is of permanent value. E. R. Chatterton. Textile Age. 9, No. 4, 56, 48 (1945).

Absorbable Cellulose

In 1941, Yackel and Kenyon reported a form of cellulose oxidized by nitrogen, in which the primary alcohol groups had been converted into carboxyl groups which permitted solution of the product in dilute alkaline solutions.

It is now evident that this type of oxodized cellulose can be absorbed by the human body and that it serves as a valuable hemostatic agent. Put into a bleeding wound it will soften and form a clot thus stopping the flow of blood. The physical form of the cellulose is still fibrous. It has been extensively studied by the Columbia Medical Center and at the Mayo Clinic.

The modified cellulose (with or without other clotting agents) may be used in wounds. It is not irritating. Its use in a large number of surgical cases shows that it is an improvement on ordinary surgical gauze. Special sterilization techniques had to be developed, because the absorbable cellulose is unstable under the usual sterilizing conditions. From "Reports on the Chemical World To-day," Ind. Eng. Chem. May 1945, pp 5 and 8.

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PAPERMAKING PATENTS

IN THE UNITED STATES—Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington 4, D. C.

Paper Manufacture

Patent No. 2,352,922. Joseph J. Thomas, Springfield, Mass., Robert A. Diehm, Appleton, Wis., and Ian C. Somerville, Philadelphia, Pa., assignors to Röhm & Haas Company, Philadelphia, Pa. No Drawing. Application October 6, 1939, Serial No. 298,240. 6 Claims. (Cl. 92—21).

6. In the process of making paper of high wet strength the improvements which comprise mixing with an aqueous suspension of paper fibers a water-soluble protein in an amount between 0.2% and about 5% of the weight of the paper fibers and a synthetic sulfonated aromatic compound having tanning properties in an amount between about 10% and about 100% of the weight of said protein, and subsequently adjusting the pH of said suspension at least to about the isoelectric point of the protein.

Apparatus for Coating

Patent No. 2,332,385. Edgar A. Laurıng, International Falls, Minn., assignor, by mesne assignments, to Minnesota and Ontario Paper Company, a corporation of Minnesota. Application July 3, 1941, Serial No. 400,915. 5 Claims. (Cl. 91—30).

1. A coating apparatus for fiber board and the like comprising a container for coating material with one open side, a conveyor positioned in open side of said container for carrying board thereacross, coatmg nozzles positioned above said conveyor, pump means for withdrawing coating material from said container and discharging through said coating nozzles, adjustable air jet nozzles positioned above said conveyor and spaced apart from said coating nozzles, rail-like members positioned along the edges of said conveyor, and spring means on one of said rail-like members for holding the fiber board against other of said rails during coating operation.

Machine for Conditioning Felts of Papermaking Machines

Patent No. 2,352,991. Frederick W. Vickery, London, England, assignor to Vickery, Incorporated, Boston, Mass., a corporation of Massachusetts. Application April 14, 1941. Serial No. 388,434. 8 Claims. (Cl. 92—50).

1. Felt conditioning mechanism, comprising a foraminous hollow cylinder of a length at least as great as the working width of the felt of a paper-making machine and over an angular portion of the periphery of which the felt engages throughout the working width of the felt, means supporting said cylinder for rotation about its axis with the felt, a device including a suction box of less width than said felt supported within said cylinder and having its suction face engaging the inner face of said cylinder opposite to the felt, means for reciprocating said device lengthwise of said cylinder while in contact with the inner face of said cylinder, and means in advance of such suction box in the direction of motion of the felt for applying cleaning liquid to the felt limited to the width of the felt next thereafter subjected to suction from said box.

Manufacture of Composite Products

Patent No. 2,355,424. Karl Dammann, Trenton, N. J., assignor to Paterson Parchment Paper Company, Bristol, Pa., a corporation of New Jersey. Application June 4, 1941. Serial No. 396,498. 18 Claims. (Cl. 91—18).

1. A machine for applying a layer of coating material to a web of paper or the like, comprising a reservoir for the coating material, a pick-up roller for carrying the coating material from the reservoir to a coating roller, a coating roller for transferring the coating material from the pick-up roller to the web, said coating roller

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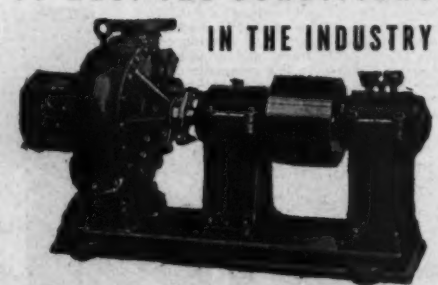

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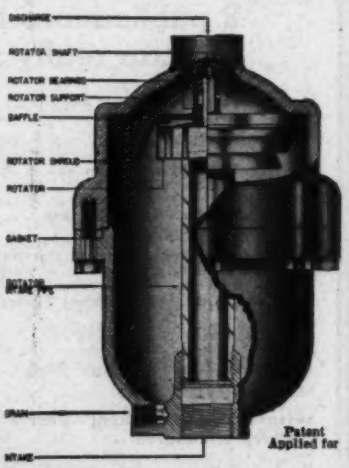

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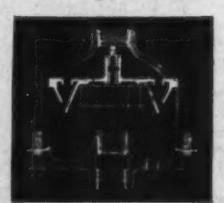

Drawing shows turbo-rotor, shroud and baffles. The design of the baffles precludes the possibility of capillary action of entrainments resulting from high velocity.

THREE MODELS AVAILABLE—A-1 will accommodate volumes from ½ to 5 cu. ft. A-2, volumes from 10 to 35 cu. ft. A-4, volumes from 35 to 100 cu. ft. Multiple units are recommended for volumes above this range. Pur-O-fier is the only standard unit that can be engineered to meet any air volume for regular or intermittent service.

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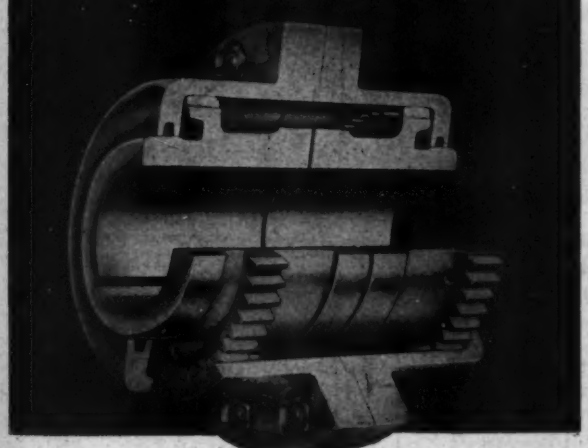

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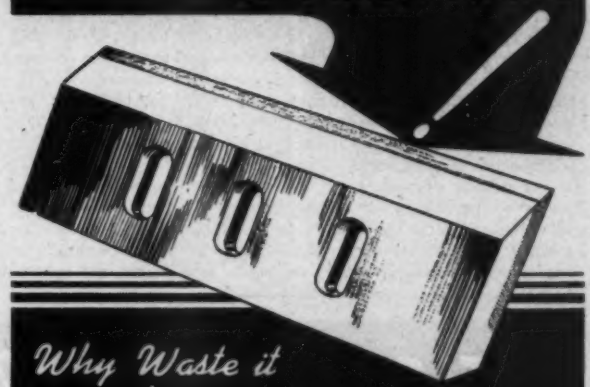

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The new Covel-Hanchett GK knife grinder will furnish you with quantities of precision-ground knife blades day after day—automatically! No skilled operator is needed. Once the blade is positioned and the controls are set, the GK takes over the responsibility.

The GK has an extra-heavy, cabinet type base. That means a solid, vibration-proof machine that will stand up under the toughest schedules with little maintenance care except routine oiling and adjustments.

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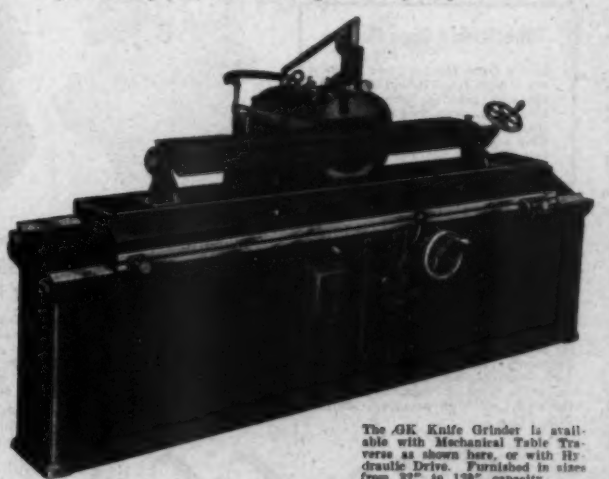

The GK Knife Grinder is available with Mechanical Table Traverse as shown here, or with Hydraulic Drive. Furnished in sizes from 32" to 130" capacity.

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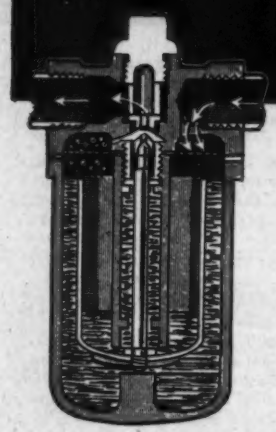
having its entire coating surface pitted with cavities, means for driving said coating roller at a surface speed less than the speed of feed of the web so that the web slides over the engaged surface portion of said coating roller and the coating material is applied from such roller to the web with a wiping action, a rotating roller engaging the applied coating material, said rotating roller being supported throughout its entire length and having a relatively small radius so as to engage the coating material in a substantially line contact, means in rear of said rollers for feeding the web and means in advance of said rollers for causing the web to be fed at a continuous, uniform rate and under a predetermined, relatively high tension

Apparatus for the Treatment and Removal of Chemicals from Cooked or Digested Fiber Pulp

Patent No. 2,355,091. Manuel C. McDonald, Monroe, La., assignor to The Brown Paper Mill Company, Inc., Monroe, La., a corporation of Delaware. Application March 16, 1939. Serial No. 262,160. 5 Claims. (Cl. 68—21).

1. In a device of the class described, the combination of a tubular perforate housing, a pressing screw rotatable therein for propelling and pressing material fed into said housing, said screw having an extension on its delivery end provided with a continuation of the thread of said screw, the receiving portion of the thread on the extension being deeper than the delivery portion of the thread on the pressing screw, said delivery and receiving thread portions being connected by a wall portion at the bottoms thereof which is offset relative to the normal continuation of said thread portions, said extension being provided with an internal passageway and a port connecting said passageway with said offset wall portion for delivering fluid from said passageway to pressed material in its travel from said pressing screw to said extension.

STICKLE *Open Float* STEAM TRAPS



● Paper men know from long experience that Stickle Open Float Steam Traps solve all phases of the drainage problem. They supply continuous, dependable and efficient service. Their action is natural, simple, positive and instantaneous. No friction or sticking—no blowing through of steam after discharge. Mechanical difficulties eliminated—no levers or hinges. Air and gases eliminated with each discharge. Stickle Traps are in operation in a majority of the paper mills of United States and Canada.

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There is a series design and size of Stickle Steam Trap for any paper mill drainage requirement: Series T Traps for low and medium pressures and for vacuum service (Bulletin No. 415). Series AE to meet large capacity requirements at medium and high pressures (Bulletin No. 315), Series 100—straight-in-line installation—to meet smaller capacity needs at medium and high pressures (Bulletin No. 115).

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Stickle Drainage and Control—a complete system making possible maximum efficiency in paper drying with decreased cost of production. Bulletin No. 260.

Stickle Reducing and Regulating Valves—especially designed for rigid paper mill accuracy, sensitivity and dependability requirements. Bulletins Nos. 235 and 435.

Stickle Open Coil Feed Water Heater—in all required sizes. Deaerating and non-deaerating. High efficiency with low cost operation and maintenance. Bulletin No. 117.

Stickle

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Paper Pulp Stock Washer

Patent No. 2,355,243. Louis J. Scheid, Watervliet, Mich., assignor to Watervliet Paper Company, Watervliet, Mich. Application March 27, 1942. Serial No. 436,487. 1 Claim. (Cl. 68—182).

In a washer for paper pulp stock, a plurality of washer tanks each having a stock inlet above the water level thereof and a cylinder mould therein, and a co-operating couch roll extending parallel to and above the mould to remove stock therefrom and elevate it, said washer tanks being disposed in vertically stepped relationship with the top of the couch roll of each tank extending above the inlet of the next higher tank, each couch roll having means for removing stock therefrom and for conveying it by gravity to the inlet of the next higher tank, means for supplying wash water to the highest tank, and a conduit extending from the interior of the cylinder mould of each elevated stepped tank to the next lower tank and adapted to convey entirely by gravity used wash water from said cylinder mould to said next lower tank for washing the pulp stock therein, means for conveying water from the interior of the cylinder mould of the lowest of said stepped tanks, and means for supplying stock to said lowermost tank for washing, and means for driving said cylinder moulds and couch rolls to separate stock from wash water and convey it from each tank to the next higher tank.

Method of Making Paper Pulp Screen Plates

Patent No. 2,352,968. Samuel T. Orton, Fitchburg, Mass., assignor to Union Screen Plate Company, Fitchburg, Mass., a corporation of Massachusetts. Application December 16, 1941. Serial No. 423,207. 2 Claims. (Cl. 204—24).

1. The method of making a pulp screen plate comprising the steps of initially shaping metal to provide a metal plate having a set of spaced ribs depending from the bottom of a thin, flat surfaced, imperforate top portion, coating the top surface of the plate with a non-conductive adhesive mask, thereafter cutting a series of parallel elongated narrow slots through the overlying coating and the thin imperforated top part of the plate between said ribs and leaving the top of the plate coated adjacent to the edges of the slots, thereafter electrolytically depositing a metal plating on said inner faces while the mask coating remains in position, then removing the mask and again electrolytically depositing a metal plating on the exposed faces of the plate.

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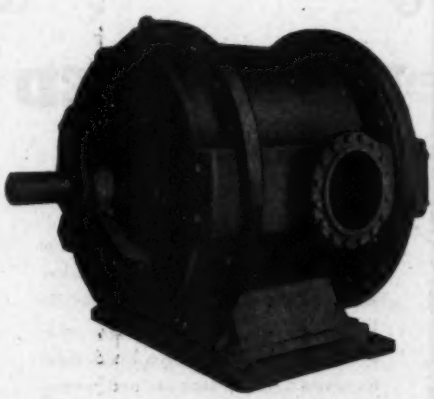

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New Catalogues and Publications

Allis-Chalmers Mfg. Company, Milwaukee, 1, Wis.—A newly prepared reconversion inventory kit covering centrifugal pumps, V-belt drives and electric motors, to facilitate quick, easy reconversion inventories of such equipment, is being distributed free by this company. The kit contains three fact sheets, one for each type of unit, with suggestions for inventory procedure, and a set of three check lists which summarize the procedures and permit detailed appraisal of each unit. These kits are available on request from the nearest Allis Chalmers district office, or from Dept. 561, Allis-Chalmers Mfg. Company, Milwaukee 1, Wis.

Automatic Switch Company, 41 East 11th Street, New York 3, N. Y.—This company has gotten out an attractive circular, No. 200, which describes its solenoid valves for the automatic and remote control of the flow of liquids and gases. In addition to descriptions and illustrations of the various types of valves, the number of a bulletin giving special information on each valve, is included.

Clark Tructractor, Battle Creek, Michigan—Just published by this company is "Materials Handling News," a 24-page pictorial showing dramatically how the pallet and maneuverable fork truck handle vital supplies for the overseas forces. Official and other photos, drawings, etc., show mechanized materials handling in action. Copies may be obtained by writing to Clark Tructractor, Battle Creek, Mich.

De Laval Steam Turbine Company, Trenton 2, New Jersey—A new catalogue devoted to the complete line of steam, turbines, helical gears, centrifugal pumps, centrifugal compressors worm gear speed reducers, and oil pumps made by this company has been issued. The brief descriptions of the equipment are accompanied by a sketch of the more noteworthy achievements of the company. An illustration of a paper machine driven by a 225 hp. De-Laval Class "C" velocity stage turbine through De Laval worm gear will be of special interest. Request Catalog No. 1181.

General American Transportation Corporation, 420 Lexington Avenue, New York 17, N. Y.—Three new bulletins have been announced by this company. In Bulletin No. 52-514a, on the "Design and Construction of Louisville Rotary Dryers," photos show the actual processes of making these dryers. Bulletin 100-514a on "Conkey Sludge Filters," has photos, typical installation layout and tables showing general materials of construction, as wall as standard sizes, weights and dimensions, which add to the interest of the booklet. The third is a well illustrated circular No. 250-514a, on "General American Drum Dryers." It includes engineering specifications and dimensions. All three bulletins may be otbained from the address above.

The B. F. Goodrich Company, Akron, Ohio—Just published by this company is an attractive 22-page booklet on Lonn rubber blow and spray guns and water savers, used in practically every industry. Copies are available on request. The booklet explains the principle of the Lonn valves, which have only three working parts. Charts showing the cost of air or water delivered through various sized orifices when uncontrolled are among the interesting features of the book. The applications of the various types of guns are outlined and pertinent details given. Attachments are also described. Also available on request is Catalogue Section 2158 on "Belt Vulcanizers." In addition to descriptions of each type of portable belt vulcanizer, the Catalogue Section gives service conditions under which they operate, and has a table with complete dimensions.

A. C. Horn Company, 43-36 Tenth Street, Long Island City 1, New York—A circular descriptive of a new cleaner for floors, painted walls, woodwork and windows called "Maintenex" may be had from this company. It is well adapted for buildings having heavy traffic.

Jessop Steel Company, Washington, Pa.—A compact booklet on its improved "T and V" cutting alloys has been gotten out by this company. Cutting speed reference charts; others showing the sizes in which square, rectangiur and round "T and V" tool bits can be obtained, as well as grinding wheel recommendations, make this a valuable reference bulletin.

Kropp Forge Company, 5301 West Roosevelt Road, Chicago 50, Ill.—A comprehensive list of forging terms with their correct definitions has been published by this company in the form of a 20-page illustrated booklet entitled, "Glossary of Forging Terms." It is intended to aid users and buyers of forgings, who may obtain a copy on request from the above company, to a better knowledge of forging practice.

Miro-O-Col Alloy Company, 2416-60 East 53rd Street, Los Angeles 11, Calif.—The latest edition of the "Welders Guide to Successful Hard Facing," available upon request to this company, includes hard facing application for paper manufacturers. This booklet explains the proper technique of application of hard facing.

New York State College of Forestry, Syracuse, N. Y.—A booklet on poison ivy and poison sumac, just published

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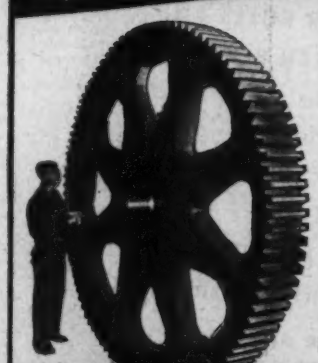

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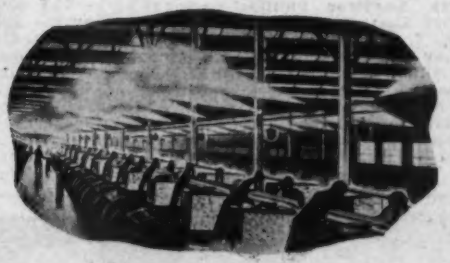

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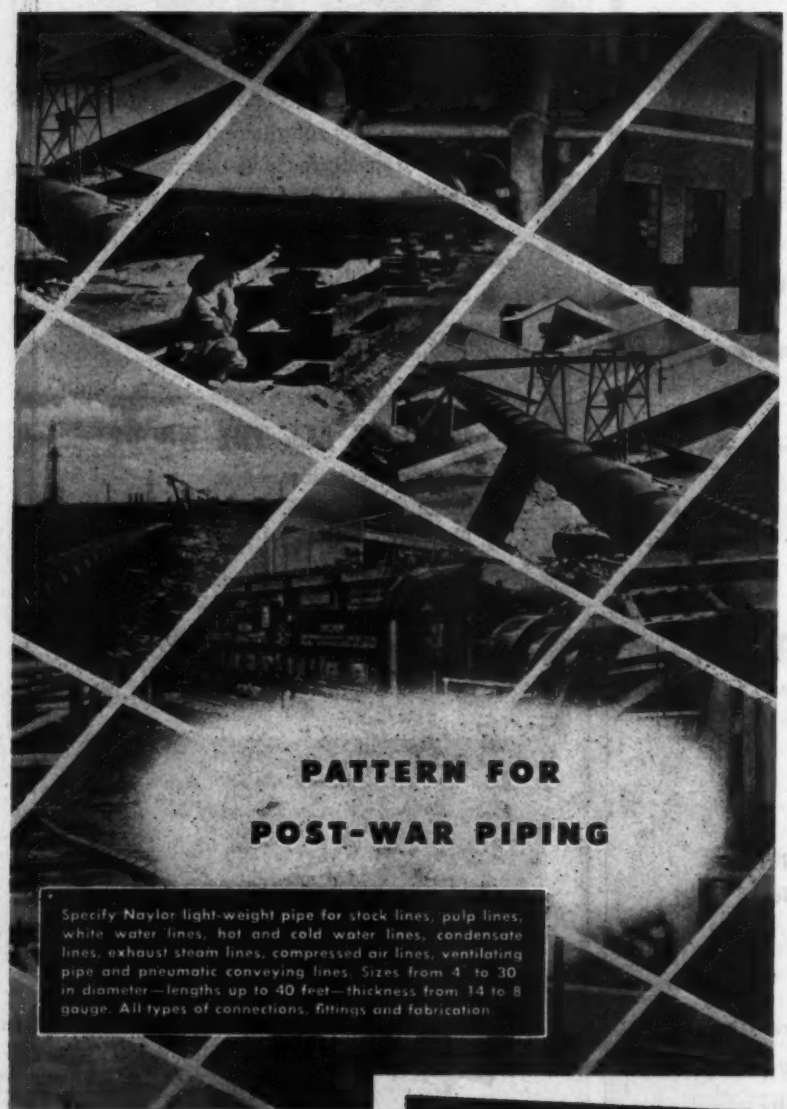
by Dr. William M. Harlow of the New York State College of Forestry is issued for the purpose of helping people to identify poison ivy, to avoid infections and to treat them. The pamphlet tells of the efforts that have been made to discover remedies for poisoning and the counteracting measures that must be taken. In addition, information is given on a voiding contamination when eradicating poison ivy. Copies are sent free on application.

North American Phillips Company, Inc., 100 East 42nd Street, New York 17, N. Y. Announcement has been made by this company of a new eight-page illustrated booklet, which describes the "Geiger-Counter Spectrometer for Industrial Research." The original material, by H. Friedman of the Naval Research Laboratory, appeared in a trade magazine. The Navy Department has given permission for its appearance in booklet form. It is a detailed discussion of the theory of X-ray powder diffraction; the operation of the spectrometer, its performance and applications. The text is illustrated with photos, diagrams and curves. Geiger-counter tubes, circuits and losses are covered at some length, and an explanation given of the "flip-flap" counting action.

Precision Scientific Company, 1750 North Springfield Ave., Chicago 47, Ill. —The new Catalogue No. 325, issued by the above company, contains 48 illustrated pages pertaining to "Precision"-Freas constant temperature control cabinet, including a variety of standard models, as well as many photos of cabinets and baths built to specifications. General information pertaining to mechanical and gravity convection heat transfer is included, as well as price list.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Reliance Electric and Engineering Company, 1076 Ivanhoe Road, Cleveland 10, Ohio—Announcement is made of the publication of an instruction sheet, No. 3042, covering the grease lubrication of anti-friction bearings in Reliance A.C. and D.C. Motors, V-S Drives and M-G Sets. This four-page bulletin gives construction, maintenance and lubrication recommendations for double-shielded ball, open ball and spherical roller bearing types, as installed on Reliance equipment.

Sales Technical Service Department, Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago — In Technical Bulletin No. 45-1, "Stanolube HD" is described the development of Stanolube HD to combat and control fuel soot and carbon deposits of the Diesel and the varnish and sludge deposits of the gasoline engine. The nature and significance of these heavy duty problems and how Stanolube HD can be most effectively applied to their solution are presented for those interested. Also included is information on army specifications, a viscosity guide, for permissible use of motor oil and aviation oil in transmissions, transfer cases and differentials, and complete lubrication requirements for trucks and buses. Requests must be made on company letterhead.

Books

A.S.T.M. Standards on Paper and Paper Products (Second Edition—This paper-covered monograph provides in latest form (as of November, 1944) the specifications, test methods, and related standards developed through the work of A.S.T.M. technical committees, particularly Committee D-6 on Paper and Paper Products. A number of standards developed in Committee D-9 on Electrical Insulating Materials are given, but for the most part the items are in the jurisdiction of Committee D-6.

Specifications included cover the following: lime and quick lime for paper and pulp manufacture; waterproof paper for curing concrete; phenolic laminated sheet and laminated thermosetting materials; and vulcanized fibre sheets, rods, and tubes for electrical insulation.

Test methods cover untreated paper used in electrical insulation; bulking thickness; machine direction; water-soluble acidity or alkalinity; resin, sampling, ash content, casein, opacity; paraffin content; starch conditioning paperboard and folding endurance; also moisture; thickness, basis weight; pentosans; internal tearing resistance; surface wettability; adhesivesness (gummed tape); flammability (treated paper and paperboard); etc.

In the development of test methods, Committee D-6 co-operates with the Technical Association of the Pulp and Paper Industry through a joint ASTM —TAPPI joint committee.

In this publication, the designations of the corresponding TAPPI methods are given at the top of the title pages of the respective standards.

Published by the American Society for Testing Materials, 260 S. Broad St., Philadelphia 2, Pa., the monograph is priced at $1.50 each.

The Waste Paper Industry—This paper-covered booklet brings together in convenient form material which first appeared serially in the January and February, 1945, issues of **Fibre Containers.** Written by Harry J. Bettendorf, the monograph sets forth the basic mechanics of waste paper collection, handling, and use, and the complex marketing relationships which exist in the waste paper industry. The booklet, nicely illustrated, totals 28 pages (8½ in. x 11 in.). It is published by Board Products Publishing Co., 228 N. La Salle St., Chicago 1, Illinois. The price is $1.50 a copy.

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CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

OPA ceiling prices in sales to consuming mills delivered buyer's usual receiving point, with brokers' allowance not in excess of 5 per cent.

	per cwt.
Blue Overalls	-6.50
Corduroy, Men's	-9.50
Corduroy, Ladies'	-9.00
Washables, No. 1	-8.00
Percales	-4.75
New Soft Blacks	-9.75
Light Prints, No. 1	-4.50
Khaki Cuttings—	
Bleachable	-4.25
Unbleachable	-3.50
New White Canvas	-6.50
New Mixed Blacks	-9.25
Canton Flannels, Bleached	-7.00
Shirt Cuttings—	
New White No. 1	-7.25
No. 1 White Headings	-7.25
White Shrunk	-6.00
Silesias No. 1	-6.75
New Unbleached	-7.50
Fancy	-3.50
Linen Cuttings—	
American	-6.00
White	-14.00
Grey	-14.00

RAGS (Domestic)

f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowance of $1 to $2 a ton depending on the value of the grade involved.

Roofing—	per ton
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	36.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
Whites, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shapporties	

ROPE and BAGGING

f. o. b. and ex dock New York City

Gunny No. 1—	per cwt.
Foreign	Nominal
Domestic	3.25 to 3.50
Wool Tares—	per cwt.
Light	3.50 to 3.75
Heavy	3.75 to 4.00
No. 1 Scrap Bagging	2.75 to 3.00
Manila Rope—	
No. 1 large	-*115.00
No. 1 small	-*105.00
Sisal Rope—	
No. 1 large	-*95.00
No. 1 small	-*80.00
New Burlap Cuttings	5.50 to 6.00
Jute Threads—	
Foreign (Nom.)	6.25 to 6.75
Domestic	5.50 to 6.00
Strings—	
No. 1 sisal	-*80.00
No. 2 sisal	-*60.00
Soft jute	5.00 to 5.50
Mixed	1.75 to 2.00

*OPA ceiling price per ton f. o. b. shipping point.

WASTE PAPER

OPA ceiling prices f. o. b. points of shipment for machine compressed bales weighing not less than 500 pounds (with differential of $5 per ton less on certain grades for loose or bundled stock), and brokers' allowance of 4 to 9 per cent.

Shavings—	per ton
White Env. Cuts, One-Cut	67.50-
Hard White Env. Cuts	62.50-
Hard White, No. 1	57.50-
Soft White, No. 1	50.00-
Soft White, One-Cut	57.50-
Soft White, Misc.	43.00-
Fly Leaf, No. 1	33.50-
Fly Leaf, Woody, No. 1	25.00-
No. 2 Mixed Col. Woody	18.00-
Flat Stock—	
No. 1 Heavy Books and Magazines	38.50-
Mixed Books	22.00-
Ledger Stock—	
No. 1 White	46.00-
No. 1 Mixed (Colored)	40.00-
Manilas—	
New Env. Cuttings	53.00-
New Env. Cuts, One-Cut	57.50-
Extra Manilas	30.00-
Manila Tab Cards, Free of Ground Wood	45.00-
Ground Wood Manila Tab Cards	27.00-
Kraft—	
Envelope Cuttings	65.00-
Mixed Env. or Bag Cuts	55.00-
Tripled Sorted No. 1 Brown	50.00-
New 100% Car. Cuts	45.00-
No. 1 Old Assorted	35.00-
News—	
White Blank	33.00-
Overissue	22.00-
No. 1 Baled	20.00-
Old Corrugated Containers	28.00-
New Corrugated Cuts	18.00-
Mill Wrappers	22.00-
Box Board Chips	14.50-
No. 1 Mixed Paper	19.00-

CHEMICALS

f. o b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25-
Ground, cwt.	4.00-
Powdered, cwt.	4.40-
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	60.00 to —
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	24.00 to 24.75
80-100 mesh (bags), lb.	—
Argentine, lb.	18.00 to 20.00
China Clay—	
Domestic Filler Bulk (mine) ton	8.50 to 16.00
Domestic Coating Bulk (mine) ton	11.00 to 22.00
Imported (ship side) Bulk (lump) ton	14.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glyc. (C.P.) drums, lb.	17.25 to 17.75
Litharge, powd., bbl., lb.	.09 to —
Rosin (Gum)—	
New York, per 100 lbs.	
E	6.75—
F	6.85—
G	7.00—
WW	8.00—
Rosin (Wood), carlots	5.25—
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	20.00 to —
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30-
Ground and flake, drums, cwt.	2.70 to 2.95
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.85 to 2.05
40 deg., 35 gal. drums, (works) cwt.	.90 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.72-
Pearl, barrels, cwt.	3.83-
Paper (Sp.) bags, cwt.	3.83-
barrels, cwt.	3.93-
Sulphur (Crude)—	
(Mine) bulk, long ton	16.00 to—
Talc—	
Dom. 100 lb. bags (mine) ton	18.00 to 21.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	5.60 to 5.85

WOOD PULP

OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo. (West of the Continental Divide and in Denver, Colo., ceilings are $8 per ton lower):

Bleached softwood sulphite	86.00
Unbleached softwood sulphite	74.00
Bleached hardwood sulphite	83.50
Unbleached hardwood sulphite	71.50
Northern bleached sulphate	86.00
Southern bleached sulphate	79.00
Northern semi-bleached sulphate	82.00
Southern semi-bleached sulphate	75.00
Northern unbleached sulphate	78.00
Southern unbleached sulphate	63.50
Bleached soda	76.00
Unbleached soda	72.00
Ground wood pulp	50.00
Ground wood—paper machine dried and mutilated	58.00
Sulphite screenings	42.50
Sulphate screenings	38.00
Ground wood screenings	32.00
Northern unbleached sulphate sideruns	73.00
Southern unbleached sulphate sideruns	63.50
Standard news print sideruns	50.00

PAPER

f. o. b. New York City

Boards—	per ton
Binders	84.00-
Chip	50.00-
Chip, tube and can	52.00-
Chip, full-bleeding	84.50-
Chip, sgl. mla. lined	62.00-
Coated, white patent .016	80.00-
.020 and heavier	75.00-
Kraft liner	63.00-
News	50.00-

Book Papers—OPA base maximum prices per cwt. 4 cases or equivalent, f. o. b. mill with quantity, weight, manufacturing and other differentials allowed:

Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	8.25
B Grade E. F.	7.80
C Grade E. F.	7.55
D Grade E. F.	7.30
E Grade E. F.	7.05
No. 2 Uncoated Offset 4 sides. White Coated White (Trimmed 4 sides)	8.45
No. 1 Glossy	11.90
No. 2 Glossy	10.85
No. 3 Glossy	10.15
No. 4 Glossy	9.80
No. 5 Glossy	9.30
C2S Offset	10.40
C1S Litho (Varnish)	10.00
C1S Litho (Non-Varnish)	9.80

Writing Papers—OPA base maximum prices per cwt. on writing papers, f. o. b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—	per cwt. 20 lb.	16 lb.
Extra 100% Rag	34.00	34.00
100% Rag	28.00	28.00
75% Rag	20.00	20.00
50% Rag	16.00	17.25
25% Rag	14.00	15.00

Rag Content Ledger—	per cwt. Zone 1
Extra 100% Rag	35.00
100% Rag	29.00
85% Rag	26.00
75% Rag	21.00
50% Rag	17.00
25% Rag	15.00

Sulphite Bond—	per cwt. 20 lb.	16 lb.
Air dry, watermarked	12.75	13.70
No. 1 (M. F.) watermarked	9.00	9.70
No. 2 (M. F.) watermarked	8.25	8.85
Plain (M. F.) unwatermarked	7.60	8.20

Sulphite Ledger—	per cwt. Zone 1
No. 1 (M. F.) watermarked	10.00
No. 2 (M. F.) watermarked	9.25
Plain (M. F.) unwatermarked	8.60

Glassine (f. o. b. mill)—	per cwt.
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleach. (25 lb. up)	11.50 to 12.00
Greaseproof— Bleach. (25 lb. up)	11.00 to 11.50
Unbleach. (25 lb. up)	10.00 to 10.50

News—OPA Ceilings—	per ton
Rolls, Standard (Contract)	61.00
Rolls, Lightweight (Cont.)	65.00
Rolls (Spot)	(Nominal)
Sheets	69.00

Tissues (Carlots)—	per ream
White, No. 1	1.12½ to 1.20
White No. 2	.90 to 1.00
Bleached Anti-Tarnish	1.15 to 1.20
Colored	—
Anti-Tarnish Kraft	.70-
Manila	.80 to .95
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.60-
Napkins, full crepe and emb'sed (13¾ lb. to M shts.) per cs.	.80-
Toilet, Bleached (M shts.) per cs.	5.85-
Toilet, Unbleached (M shts.) per cs.	4.25-

Towels—	per case
Bleached	3.30 to 3.75
Unbleached	2.60 to 2.95

Wrappings (Kraft)—	per cwt.
Super-Standard	5.25 to 7.65
No. 1 Wrapping	5.00 to 7.40
Standard Wrapping	4.75 to 7.15
Standard Bag	4.37½

Wrappings (Sulphite and Bleached Kraft)—	
(Rolls, f. o. b. mill)	
Bleached Papers—	
M.F. & M.G. Waxing, 30 lb. (Carloads only)	7.25 to 7.50
(10,000 lbs.)	7.50 to 7.75
Drug wrapp. 25 lb.	7.00 to 7.25
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	5.50 to 5.75
No. 1 Butchers	5.75 to 6.00
No. 1 Imit. Parch & Dry Fin. Grse. Sulphite 30 lb.	6.25 to 6.50
No. 2 Imit. Parch & Dry Fin. Grse. Sulphite 30 lb.	6.00 to 6.25
Steam Finish, 50 lb.	5.00 to 5.25
Water Finish, 40 lb.	5.50 to 5.75

Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	6.00 to 6.50
Envp. Mla., Sub. 16-28 (No. 2)	5.75 to 6.00
Envp. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	6.00 to 6.25
No. 2	5.75 to 6.00
M.G. Sulphite and Kraft (other than Waxing)	
Grade A-22 lb.	7.20 to 7.40
Grade B-30 lb.	6.75 to 7.00

O God, give the world common sense, beginning with me.

—*Prayer of a Chinese Christian*

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Bailey Meter Company 551
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Bauer Bros. Co., The 639
Beloit Iron Works 477
Binney & Smith Co. 639
Bird Machine Company 525
Bird-White Company 632
Black-Clawson Co., The 510
Blackmer Pump Company 596
Boston Woven Hose & Rubber Co.
Bowser, Incorporated 524
Bowsher Co., The N. P. 629
Brandon Corp. (Woodward, Baldwin & Company) 619
Brown Instrument Co., The
Buffalo Forge Company
Buffalo Pumps, Inc. 599

Calco Chemical Division, American Cyanamid Company
Cambridge Instrument Co.
Cameron Machine Co. 631
Carthage Machine Co.
Cash Company, A. W. 573
Chain Belt Company 577
Chemipulp Process, Inc. 642
Chicago Bridge & Iron Co. 483
Chicago Electric Company 594
Chromium Corp. of America 482
Clark Tructractor Division of Clark Equipment Company 496
Classified Advertising 642
Clayton Manufacturing Co. 498
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. 593
Cochrane Corporation
Columbia Chemical Division 563
Columbian Carbon Company 639
Cooper Alloy Foundry Co., The 575
Corning Glass Works 520
Covel-Hanchett Company 633
Crane Co. 595

Darnell Corporation, Ltd. 626
De Laval Steam Turbine Co. 484
DeZurik Shower Company
Diamond Alkali Company 486
Dilts Machine Works 510
Dow Chemical Co., The 508
Downingtown Mfg. Co. ..... 1st Cover
Draper Brothers Company 555
Dresser Industries, Inc.
du Pont de Nemours & Co., E. I.
Duriron Co., Inc., The

Eastern Stainless Steel Corp.
Eastwood-Nealley Corporation 606
Ecusta Paper Corporation 637
Electric Machinery Mfg. Co. 515
Electro-Coatings, Inc. 635
Elwell-Parker Electric Co., The 587
English China Clays Sales Corp. 602
Enterprise Engine & Foundry Co. 485

Fairbanks Company, The
Fairbanks, Morse & Co.
Falk Corporation, The 504-505
Ferguson & Co., Hardy S. 629
Fleishel Lumber Company 571
Flexible Steel Lacing Co.
Flexo Supply Company, Inc. 628
Flori Pipe Company
Foxboro Company, The 527
Frederick Iron & Steel Co. 632
Fritz Publications, Inc. 631, 644
Fuller Brush Company, The

Garlock Packing Co., The 625
Gates Rubber Company 531
General American Transportation Corporation 518-519
General Chemical Company 557
General Coal Co.
General Electric Company
Glidden Company, The
Goslin-Birmingham Mfg. Co., Inc. 497
Goulds Pumps, Inc. 586
Groch Engineering Co. 592
Gruendler Crusher & Pulverizer Co. 612

Hardy, George F. 642
Harper Company, The H. M. 509
Harrington & King Perforating Co. 621
Harris-Seybold-Potter Co. 493
Hills-McCanna Company 566
Honan-Crane Corporation 478
Hooper & Sons Co., Wm. E. 581
Hudson-Sharp Machine Company 636
Hunt Machine Co., Rodney
Huyck & Sons, F. C.
Hyster Company 512

Improved Paper Machinery Corp.
Industrial Gear Mfg. Co. 636
Industrial Steels, Inc. 495
Ingersoll-Rand Company
International Nickel Co., Inc. 526
International Wire Works 588

Jeffrey Mfg. Co., The
Jenkins Bros.
Johnson Corporation, The 509
Jones & Sons Company, E. D. 642
Jones Foundry & Machine Co., W. A. 610

Kalamazoo Tank & Silo Co. 600
Kalamazoo Vegetable Parchment Co. 641
Kelco Company 523
Klemp Company, Wm. F. 621

Langston Co., Samuel M. ..... 3rd Cover
Layne & Bowler, Inc. 576
Lewellen Manufacturing Co. 625
Lindsay Wire Weaving Co., The 597
Link-Belt Company
Lockport Felt Company
Lodding Engineering Corp.
Lunkenheimer Co., The 580

Magnetic Pigment Division, Columbian Carbon Company
Magnus Chemical Co., Inc.
Marion Machine, Foundry & Supply Co. 641
Mason-Neilan Regulator Co.
Mathieson Alkali Works, Inc. 480
Michigan Steel Casting Co. 604
Midwest Piping & Supply Co., Inc.
Monsanto Chemical Company 611
Morris Machine Works 499
Mt. Vernon-Woodberry Mills, Inc. 553
Murray Mfg. Co., D. J. 629

Nash Engineering Co., The 635
National Oil Products Co. 589
National Publishers Ass'n, Inc. 615
National Research Bureau, Inc.
National Safety Council, Inc. 598
Naylor Pipe Company 638
Nichols Engr. & Research Corp.
Norma-Hoffmann Bearings Corp. 623
Northern Engineering Works
Norton Company 487
Norwood Engineering Co., The

Oakite Products, Inc. 628
Ohio Injector Co., The
Oliver United Filters, Inc. 503
Orr Felt & Blanket Co., The 623

Paper & Industrial Appliances, Inc. 506
Paper Makers Chemical Dept. of Hercules Powder Company 561
Patterson Foundry & Mach. Co.
Peerless Pump Division 621
Perkins & Son, Inc., B. F. 522
Permutit Company, The
Philco Corporation 479
Photovolt Corporation 633
Pittsburgh Piping & Equipment Co. 579
Pittsburgh Plate Glass Co., Columbia Chemical Division 563
Poole Foundry & Machine Co. 633
Powell Company, The Wm. 529
Pusey & Jones Corp., The 491

Reichhold Chemicals, Inc.
Reliance Electric & Engr. Co.
Research Corporation 559
Rockwood Manufacturing Co. ..... 2nd Cover
Rogers & Co., Samuel C. 631
Rollway Bearing Co., Inc.
Roofing Machinery Mfg. Co. 560
Roots-Connersville Blower Corp.
Ross Engineering Corp., J. O.
Ryerson & Son, Inc., Joseph T. 532, 619

Sandusky Foundry & Machine Co. 590
Sandy Hill Iron & Brass Works, The 605
Shartle Bros. Machine Co. 510
Shuler & Benninghofen 603
Simonds Worden White Co. 641
Smith & Winchester Mfg. Co. 627
Solvay Sales Corporation 627
Spraying Systems Company
Standard Oil Co. (Indiana) 517
Stebbins Engr. & Mfg. Co. 558
Stein, Hall & Company, Inc.
Stickle Steam Specialties Co. 634
Sutherland Refiner Corporation 507
Swenson Evaporator Company

Taylor Forge & Pipe Works
Texas Company, The ..... 4th Cover
Timken Roller Bearing Co., The 565
Titanium Pigment Corporation 601
Towmotor Corporation 567
Trimbey Machine Works 621
Turner Halsey Company 553
U. S. A., Treasury Dept. 617
United Status Rubber Company
U. S. Stoneware Co.
Valley Iron Works Company 530
Vanderbilt Co., Inc., R. T.
Waldron Corporation, John 642
Warren Steam Pump Co., Inc. 569
Waterbury & Sons Co., H. 608
Waterbury Felt Co., The 568
Western Precipitation Corp.
Westinghouse Electric Corporation
Weyerhaeuser Timber Co.
Whiting Corporation
Wilkens-Anderson Company 619
Williams and Co., C. K. 608
Williams-Gray Company 637
Woodward, Baldwin & Co. 619
Worthington Pump & Machinery Corp. 511
Wright Manufacturing Div., American Chain & Cable Co. 585
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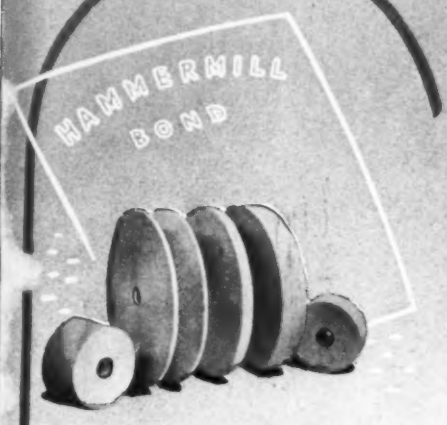

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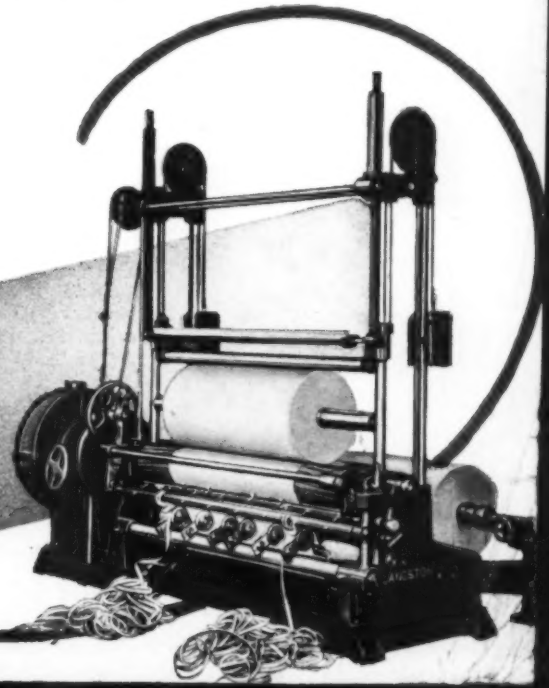

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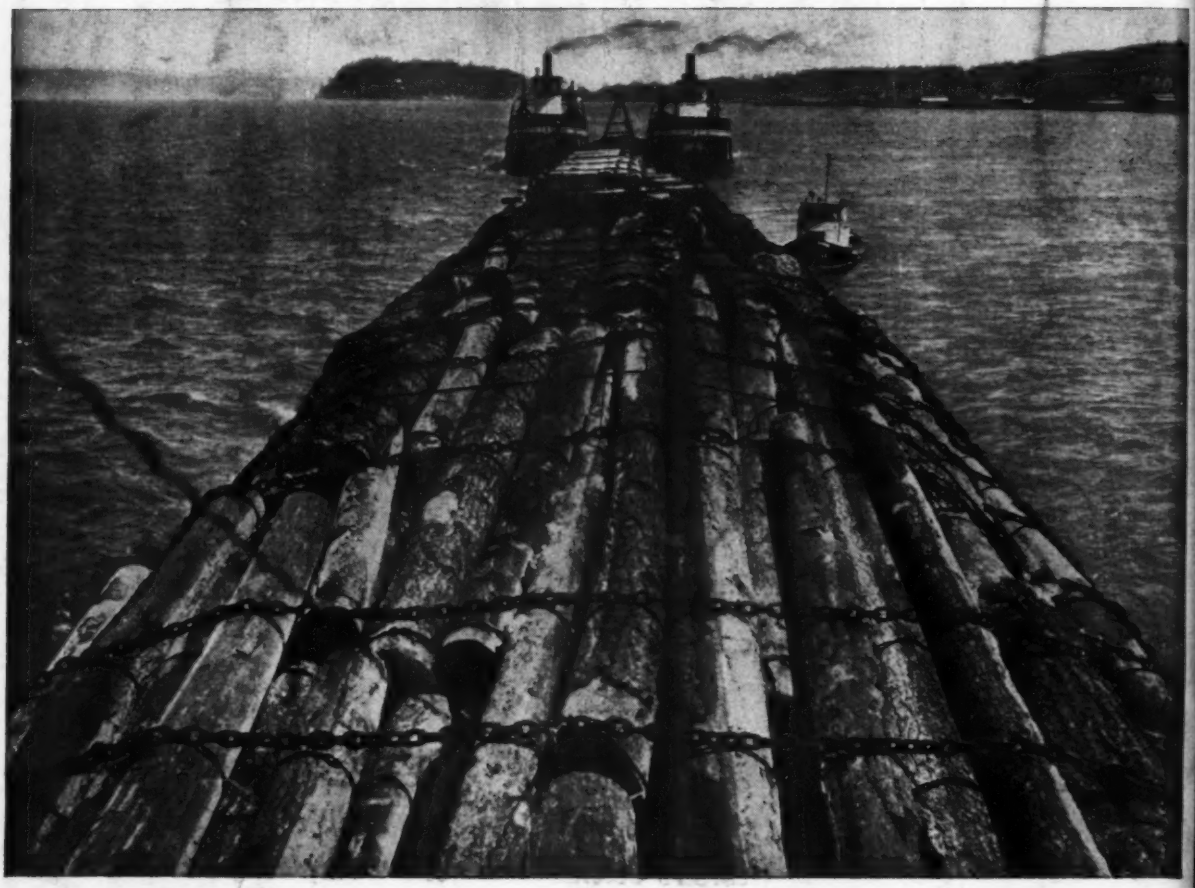
SLITTERS AND ROLL WINDERS



Raw Material for War Material

INCREASING production of wood pulp — raw material for thousands of war items — is still an urgent need. More lumber, too, for building boats, barracks, hangars, and for countless other military necessities must be cut.

To convert timber speedily into pulp and lumber, mills must have adequate, dependable power. Wherever turbines are used, this is more easily assured through effective lubrication — Texaco.

Texaco Regal Oils (R & O) for example, are highly resistant to oxidation, foaming, sludging and gum formation. They are also scientifically designed to prevent rusting of turbine lubricating systems. Because of these qualities, *Texaco Regal Oils (R & O)* keep turbine systems clean, bearing temperatures normal, governor action smooth and sensitive. They fully meet specifications of all leading turbine builders and the turbine oil specifications of the U. S. Navy.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed at the right.

For suggestions on the proper care of oil and maintenance of turbine systems, call on Texaco Lubrication Engineering Service, available through more than 2300 Texaco distributing plants in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ *More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.*

★ *More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.*

★ *More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.*

★ *More revenue airline miles in the U. S. are flown with Texaco than with any other brand.*

★ *More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.*

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